xermobile Scoopmobile

Blaw-Knox Hi-Boy Mixer

620

Contractors and Engineers

magazine of modern construction

JANUARY 1955

Insley Type WB Shovel

International TD 24 Tractors

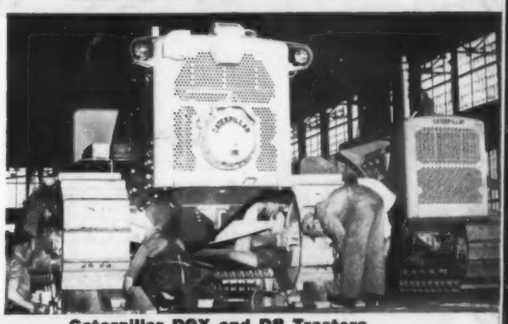
Worthington Blue Brute Rotary Compressor

Webrib Hico Form Girders

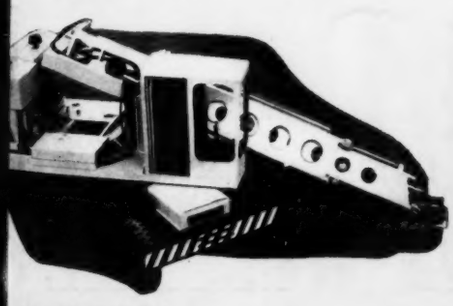
Rome Disk Harrow

Euclid Twin-Power TC-12 Tractor

Galion Roll-O-Matic Roller



Caterpillar D9X and D8 Tractors



Gradall Excavator

Michigan Tractor Shovel

PRODUCT PARADE of 1955

See Page 83

For Virginia's main truck route · · ·

Laying the 1½-inch Texaco Sand Asphalt wearing surface over 5½-inch base of same type during construction of new traffic lane for US-301 in Virginia.

. . . this 7-inch Texaco Sand Asphalt pavement

No longer adequate for today's traffic, this existing section of US-301 will serve one-way traffic when new Texaco-paved lane is completed.

Contractor

ADAMS CONSTRUCTION CO., ROANOKE, VA.

Most of the heavy truck traffic moving north and south through Virginia uses U.S. Route 301. To cope with its ever-increasing volume of traffic, the State gradually is converting US-301 into a dual highway.

The accompanying photographs show the construction of a new lane which parallels the existing route south of Petersburg. Plant-mixed Texaco Sand Asphalt was used for both base and wearing surface in this project. The base, 5½ inches thick, was constructed in three courses, on which the surface was laid to a thickness of 1½ inches. An 8-inch sand-clay sub-base supports the Texaco Sand Asphalt pavement.

Virginia put the emphasis on flexibility in constructing this new section of US-301. Flexible, resilient, shock-absorbing highways like this one are the most effective answer to today's heavy traffic. They withstand impact longer, hold maintenance costs down to a minimum and have a lower first cost than other highways with the same load-carrying capacity.

Helpful information about Sand Asphalt, as well as other road and street types constructed with Texaco Asphalt Cements, Cutback Asphalts and Slow-curing Asphaltic Oils, is available in two booklets, which can be secured without obligation by writing our nearest office.

THE TEXAS COMPANY, Asphalt Sales Div., 135 E. 42nd Street, New York 17

Boston 16 (20 Providence St.) • **Chicago 4** (332 So. Michigan Ave.) • **Houston 1** (720 San Jacinto St.)
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TEXACO REG. T. M.

TEXACO ASPHALT

Contractors and Engineers

magazine of modern construction

CONTENTS

JANUARY 1955

AIRPORT

Heavy concrete pavement is laid at air force test center 20

BRIDGES

Three piers for Mackinac bridge are completed as season ends 28
Central yard turns out precast-concrete piles for bridges 50
Deck slab sections, cast upside down, require simple forms 130

BUILDINGS

Adaptation of tilt-up technique cuts cost 50
Adjustable forms save material and time on hospital job 60
Piers, lift-slab barracks form part of navy base expansion 118

DAMS AND FLOOD CONTROL

Traveling jumbo, mounting 14 drills, speeds blasting of tailrace 10
Pile dikes and riprap control bank erosion 16

GENERAL

The weather outlook for February 6
Money matters affecting the construction industry 12
Industrial parking field paved with asphaltic concrete 14
Mobile radio units coordinate Mackinac bridge operations 34
High concrete stack is toppled accurately in busy area 122
Excavating equipment: smaller units 126
Tips on winter concreting 148

HIGHWAYS

Mobile electronic unit tests asphalt roads, records results 5
Earthmovers gouge highway through mountainous country 24
Local materials go into construction of desert road 46
Slag lift and blacktop strengthen failing highway 72
Portable hot-mix plant works on six jobs in one season 136
Widening and resurfacing 20-foot pavement 144

PIPELINE

Fuel-supply line is strung across difficult arctic terrain 74

PORTRAIT IN PRINT

George W. Rogers, marine and harbor contractor 76

TUNNELS

Arch lining precedes invert pour on water-supply aqueduct 40
Safety measures minimize health hazards 62

Product Parade 83

Building Materials 107

DEPARTMENTS

Avoid Legal Pitfalls 135
Construction Camera 112
Convention Calendar 38
Distributor Doings 152
Editorial 4
Manufacturer Memos 158
Names in the News 8
News & Views 4

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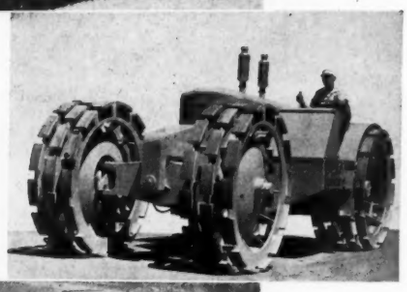
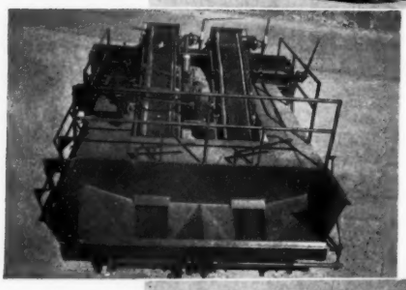




EDITORIAL

The trend to self-propelled equipment

A definite trend toward self-propelled equipment is now apparent, particularly in smaller road-building machinery. Even such small equipment as compressors or pneumatic rollers is now offered in self-propelled models.

Alert highway-building contractors are mainly responsible for this trend to special equipment which works faster and at lower cost.

Not so quick to jump on the bandwagon are governmental agencies—federal, state, county, and municipal—which use construction equipment. A county board of supervisors, for example, is mighty reluctant to tie up $12,000 in a self-propelled machine when the same equipment in a now obsolete pull-type model can be had for half as much. Many citizens also are limited in their breadth of vision. To these people, it's a breach of public trust to pay $12,000 when "something just as good" can be had for $6,000.

Contractors know better. Nobody is more acutely dollar conscious than a contractor—or as much responsive to anything capable of lowering over-all costs. A contractor knows that a manufacturer of self-propelled equipment has to include enough motive power to permit a machine to do its job properly. A contractor knows that pull models often require second operators, and that another employee can be a costly commodity. And he knows the chance of equipment breakdown is increased when separate units are used, each one dependent on the other.

That is why many contractors often develop self-propelled equipment in their own shops before such units are commercially produced. This was the case with a self-propelled chip spreader for high-speed sealcoat work. Developed by a road-building contractor, the machine now is manufactured commercially.

Public agencies, particularly, will do well to mark this trend toward the use of self-propelled equipment, which produces lower work costs. If public officials get this idea across to their constituents, they can rid maintenance and construction yards of obsolete junk and get more value out of the road dollars they hold in trust.

NEWS AND VIEWS

Two matters of particular concern to the construction industry get off the ground in Washington this month. One is the President's "grand plan" for the interstate highway system, which is expected to be included in his legislative program to be submitted to the 84th Congress. This ten-year program, the Bureau of Public Roads has estimated, would cost $101 billion.

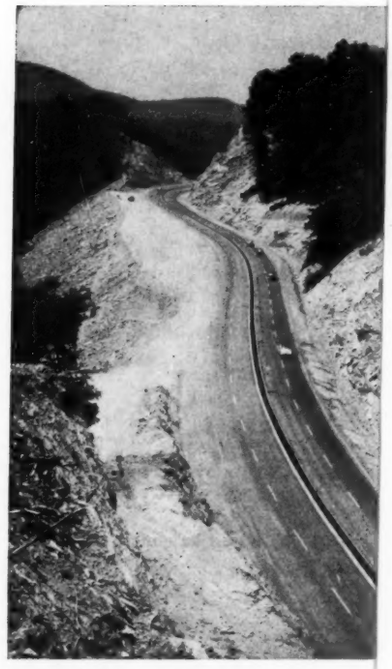
In the past few months, however, reports have pegged the cost of the program at $50 billion. And in a speech before the General Assembly of the Council of State Governments, Gen. Lucius D. Clay, chairman of the Advisory Committee on a National Highway Program, was reported favoring a $24 billion program.

Here's what the lower figures actually mean: $54 billion is needed to supplement the $47 billion ordinarily spent on roads by federal, state, and local governments. Gen. Clay proposes that the federal contribution to the total be $24 billion, while other levels of government furnish the remaining $30 billion to finance the $101-billion program.

Whether Congress will approve this highway legislation is as speculative a matter as the means the government will use to raise its share of the total. The plan currently finding most favor would have a federal commission issue revenue bonds backed by the federal motor-fuel tax.

The second item of importance is a behind-the-scenes operation being undertaken by the Bureau of the Census. Right now, millions of questionnaires are in the mail for manufacturers, and the bureau hopes these will be accurately completed and promptly returned so that the job of compiling and editing the 1954 Census of Manufactures can begin. This statistical information will be made available to manufacturers as an aid in developing markets, determining production and distribution schedules, and studying competition and costs.

Reports will remain confidential, and the operations of a single firm will not be recognizable in the published report. Construction machinery, sand and gravel, wood, explosives, cement and lime, concrete and petroleum products, asphalt and paving products are among items to be covered in the report. When this five-year census is completed, less comprehensive reports—made annually, quarterly, and monthly—will keep manufacturers' production figures up to date.



Representative of today's improved highways is this four-lane section of U. S. 70 over the Blue Ridge Divide in North Carolina. Minimum grades of 6 per cent and curves of 6 degrees or less replace the steep grades and hairpin curves of the old two-lane road.

Electronic device tests asphalt roads in place

This new machine developed by Shell Oil Co. technicians simulates traffic loads to test the capacity of asphalt roads. Vibrations generated by revolving spokes in the cylinder on top are transmitted to a base plate underneath the striped ballast unit. Effects are recorded by the electronic equipment in the panel truck. *Shell Oil Co. Photo*

A new method of testing the load-carrying capacity of bituminous-concrete roads was given its first public demonstration recently by the Shell Oil Co., New York, N. Y. The demonstration was held at the U. S. Bureau of Public Roads' Langley Research Station near Alexandria, Va.

Noteworthy as a nondestructive method of dynamic testing of roads in place, the process utilizes a mobile machine which simulates the jarring effects of actual road traffic and records the effects with electronic equipment. No samples or laboratory work are required, as answers are given immediately on the spot.

Testing is done with the machine in a stationary position. Dynamic force is generated by revolving spokes on horizontal shafts with eccentric weights. The loads generated are imparted to the road through a vertical shaft and base plate which vibrates against the pavement. By changing the sizes and eccentricities of the weights and the speed at which the spokes turn, various traffic conditions are simulated.

The total force acting on the pavement can be changed from 0 to about 8,000 pounds, and the unit load is of the order produced by automobile and truck traffic 20 to 80 psi. Factors measured are stiffness, or the mathematical relation of load and vertical deflection; strain, or the amount of stretch or shortening in the wearing surface; velocities, or the rates of propagation of waves in the pavement foundation; and fatigue characteristics.

Tests Entire Construction

A particular feature of the machine is that it tests the entire asphaltic road construction, including subbase and subsoil layers, in place. In recording wave velocities in various base and subbase materials, the device furnishes engineers with valuable design information.

The method has been employed experimentally on the WASHO test road in Idaho, and WASHO officials are at present correlating information obtained from both the Idaho test program and the new testing machine. Corps of Engineers officials also have used the machine for some experimental testing.

The machine was developed by Shell laboratory personnel in Amsterdam, The Netherlands, over a period of ten years. Plans for its design and the assistance of Shell technicians will be made available to any manufacturer who is interested in producing the machine.

Among those attending the demonstration at Langley Station were representatives of the Bureau of Public Roads, U. S. Army Corps of Engineers, Civil Aeronautics Administration, Highway Research Board, several state highway associations, and firms and organizations connected with road building and maintenance, as well as selected representatives of the press.

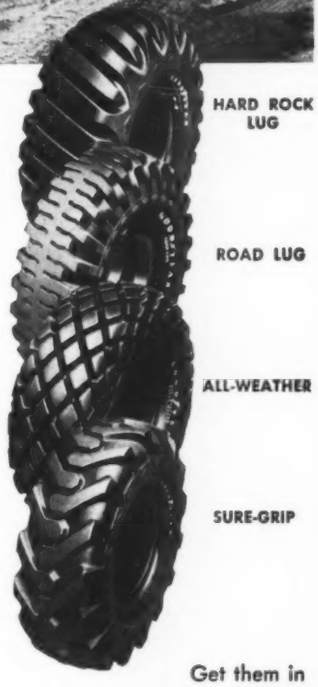
The Product Parade starts on page 83.

The 60-million-dollar port for jet bombers, now building at Portsmouth, N.H., calls for 4,710,000 yards of excavation, 3,000,000 yards of common fill, 750,000 yards of stripping, 431,000 yards of sand fill and 220,000 yards of borrow. Despite freakish distribution of sand and clay deposits, a huge city water well almost dead center of the field—and the heaviest rainfall in years—closely co-ordinated teamwork (as shown above) keeps this job rolling 20% ahead of schedule!

Goodyear tires help keep jobs rolling with the strongest, most durable tire cord ever produced—

3-T NYLON

Made only by Goodyear's *patented* process, 3-T NYLON can take terrific punishment. Users say bruise-breaks are practically unknown, tire growth is controlled. 3-T NYLON is also so *heat-resistant* that users say separation, flex failures and heat blowouts are almost things of the past! Equally important, 3-T NYLON *retains* these qualities—makes Goodyear tires the safest, most lasting on the toughest jobs—cuts total costs with many more relugs or recaps. Better check into 3-T NYLON before buying or specifying any new tire. Goodyear, Truck Tire Dept., Akron 16, Ohio.



Get them in **3-T NYLON** for longest life ever!

FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Road Lug, All-Weather, Sure-Grip—T.M.'s
The Goodyear Tire & Rubber Company, Akron, Ohio

Charts for February

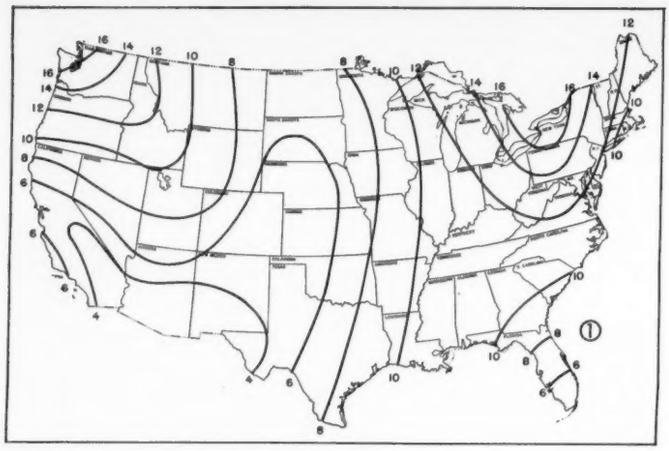


Chart 1. Days with .01 inch or more of precipitation.

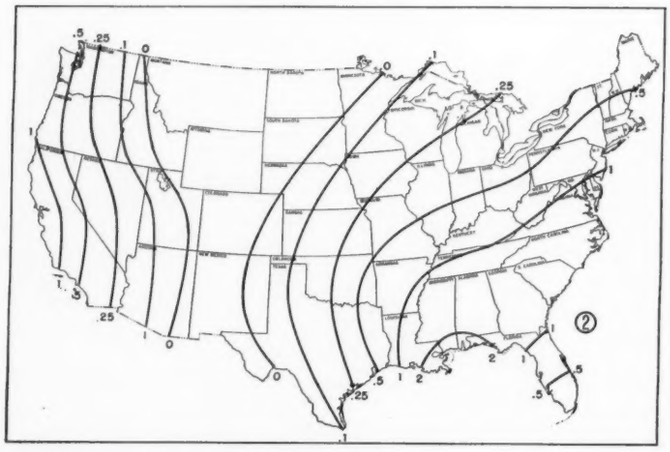


Chart 2. Days with 1 or more inches of precipitation.

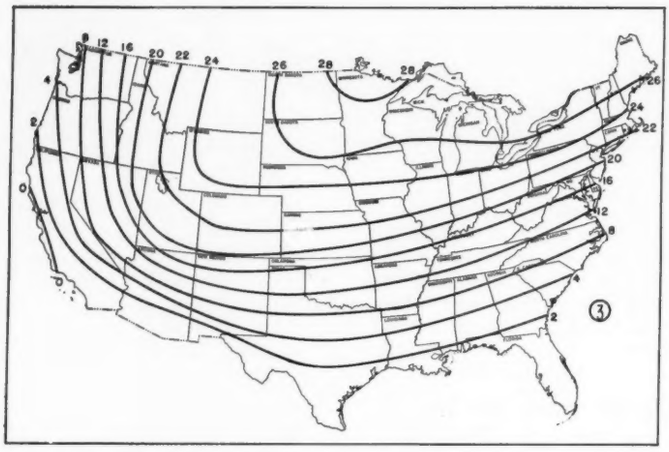


Chart 3. Days with temperatures below freezing.

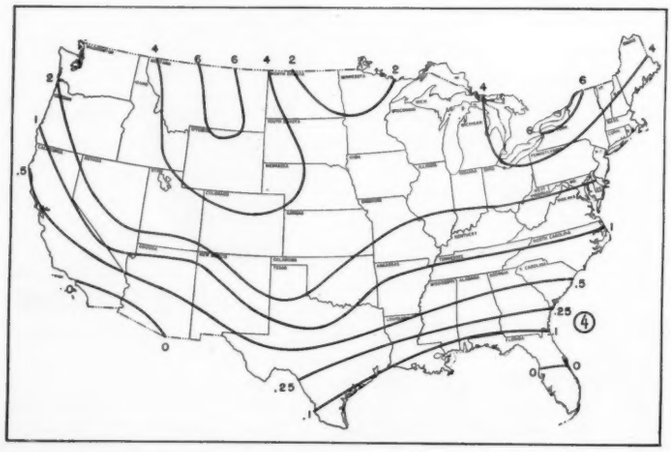


Chart 4. Days with 1 or more inches of snowfall.

The weather outlook

These February charts are the first of a series on expected precipitation and temperatures

Too often, weather has accounted for losses in time and money, as well as special problems developing on a job. To help minimize guesswork about weather conditions *Contractors and Engineers* begins, in this issue, the publication of monthly climatological charts showing weather conditions to be expected throughout the United States.

This series is presented to fill a need expressed by contractors. A questionnaire prepared by Weather Corporation of America and sent out by *Contractors and Engineers* demonstrated that the elements are of the greatest concern to contractors everywhere. A total of 19 items, including rainfall, temperatures, wind, thunderstorms, tornadoes, hailstorms, etc., were included in the survey.

Temperatures were also of considerable concern, particularly freezing temperatures and the number of days on which they could be expected. This, coupled with interest in the number of days with snowfall each month, reflected the importance of winter working conditions, particularly now when the growing volume of work is forcing the construction industry into year-round operations.

As a result, Weather Corporation of America has prepared the answers to these questions in the form of a series of climatological charts. More detailed information can be had from its offices at 39 Broadway, New York, N. Y., or Railway Exchange Building, St. Louis, Mo.

For February, Chart 1 shows the number of days with measurable precipitation to be expected. The curved lines connect the areas where the indicated number of days of precipitation can be expected. Areas between can expect the number of days falling between the boundary lines; that is, the area between the 6-day and 8-day isopleths can expect 7 days of precipitation of .01 or more.

In this same manner, Chart 2 shows the expected number of days with heavy precipitation—one inch or more in a 24-hour period. Lines marked .50, .25, and .10 indicate an event occurring once in 2 years, once in 4 years, and once in 10 years, respectively.

Chart 3 shows the number of days on which freezing temperatures will occur. These are days on which the minimum temperature will reach 32 degrees F, or less.

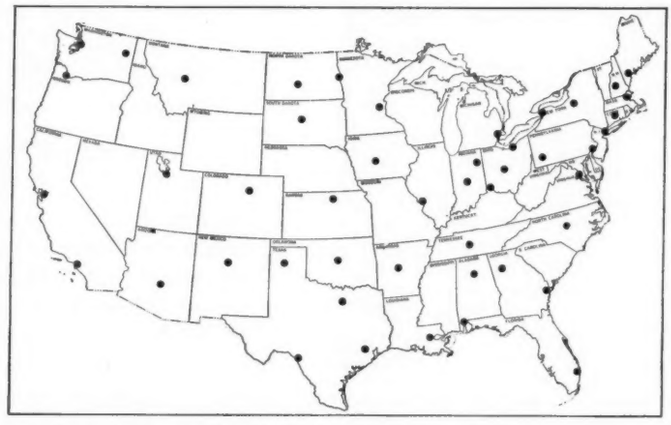
Chart 4 gives the number of days on which snowfall can be expected.

These charts are in no sense specific forecasts. But they do set forth the probability of future weather conditions, based on the records of past weather at 50 weather stations throughout the country.

This data goes back as far as 80 years, which means that the probability derived from them will be virtually unchanging for many years. Thus, the series of charts may be retained for future reference from year to year.

Contractors and Engineers presents this information as a service to the members of the construction industry, who can plan more accurately and profitably when weather conditions are known. Data for ensuing months will be presented in succeeding issues.

THE END



The 50 weather stations throughout the country that supply data:

Albuquerque, N. Mex.	Concordia, Kans.	Little Rock, Ark.	Pittsburgh, Pa.
Amarillo, Texas	Dallas, Texas	Los Angeles, Calif.	Portland, Maine
Atlanta, Ga.	Del Rio, Texas	Miami, Fla.	Portland, Oreg.
Birmingham, Ala.	Denver, Colo.	Milwaukee, Wis.	Raleigh, N. C.
Bismarck, N. Dak.	Des Moines, Iowa	Minneapolis, Minn.	Richmond, Va.
Boston, Mass.	Detroit, Mich.	Mobile, Ala.	St. Louis, Mo.
Buffalo, N. Y.	Fargo, N. Dak.	Nashville, Tenn.	Salt Lake City, Utah
Chicago, Ill.	Fort Wayne, Ind.	New Orleans, La.	San Francisco, Calif.
Cincinnati, Ohio	Hartford, Conn.	New York, N. Y.	Savannah, Ga.
Cleveland, Ohio	Helena, Mont.	Oklahoma City, Okla.	Seattle, Wash.
Columbus, Ohio	Houston, Texas	Philadelphia, Pa.	Spokane, Wash.
Concord, N. H.	Indianapolis, Ind.	Phoenix, Ariz.	Syracuse, N. Y.
		Pierre, S. Dak.	Washington, D. C.

Chain Belt Division Makes Appointments

The Construction Machinery Division of Chain Belt Co., Milwaukee, Wis., has appointed Harold Lavin and John W. Smith as sales managers of the eastern and southwestern districts, respectively.

With the exception of four years spent in the Navy, Mr. Lavin has been with Chain Belt since 1942, when he joined the company as a student engineer. In 1949, he became district sales engineer and in 1954 was promoted to southwest district manager.

Mr. Smith has taken Mr. Lavin's former position as southwest district sales manager. He has been with the company since he became a student engineer trainee in 1952. Headquarters for the southwest district are located in Houston, Texas.

Whitehead Is Promoted By H. K. Ferguson Co.

John R. Whitehead has been made chief engineer of the Cincinnati office of The H. K. Ferguson Co., engineering and building concern of Cleveland, Ohio. From the new Cincinnati area office at Lockland, he will be in charge of all engineering work in the greater Cincinnati area.

Mr. Whitehead recently served the company as project engineer for the design and construction of a multi-million-dollar metallic titanium plant built for Titanium Metals Corp. of America near Las Vegas, Nev. He joined the Ferguson organization as a mechanical engineer in the Cleveland headquarters in 1946.

Engineers Named to Head Three Districts

The U. S. Army Corps of Engineers has assigned three engineers to head the New England Division, and the Philadelphia and Memphis districts.

Col. Robert J. Fleming, Jr., has been appointed New England Division Engineer. He will be succeeded as district engineer at Philadelphia by Col. Allen F. Clark, Jr.

The former assistant to the district engineer at Memphis, Col. E. B. Downing, has been promoted to district engineer, succeeding Col. Clark.

Each of the appointees has over 20 years' experience in the corps and has served with military engineer groups at home and abroad.

Lippert Bin Co. Moves

The Lippert Bin Co., formerly of London, Ohio, has moved into larger manufacturing and office quarters at Columbus, Ohio.

The firm, manufacturer of batching and storage bins, elevators, weigh batchers, and screw conveyors for bulk cement, has expanded its facilities to increase production and insure better service to customers.

Marietta Appoints

Henning de Bang has been appointed chief engineer of the design development division of the Baltimore, Md., branch of the Marietta Concrete Corp., Marietta, Ohio.

Before joining the organization, Mr. de Bang was associated with Ford, Bacon & Davis, Inc., consulting engineering firm of New York, N. Y. During that time, he served as field consultant on precast insulated wall panels which were developed jointly by Ford, Bacon & Davis and Marietta Concrete.

Diamond Assigns Two District Sales Managers

Two new district sales managers have been appointed by the Diamond Iron Works, Division of Goodman Mfg. Co., Chicago, Ill.

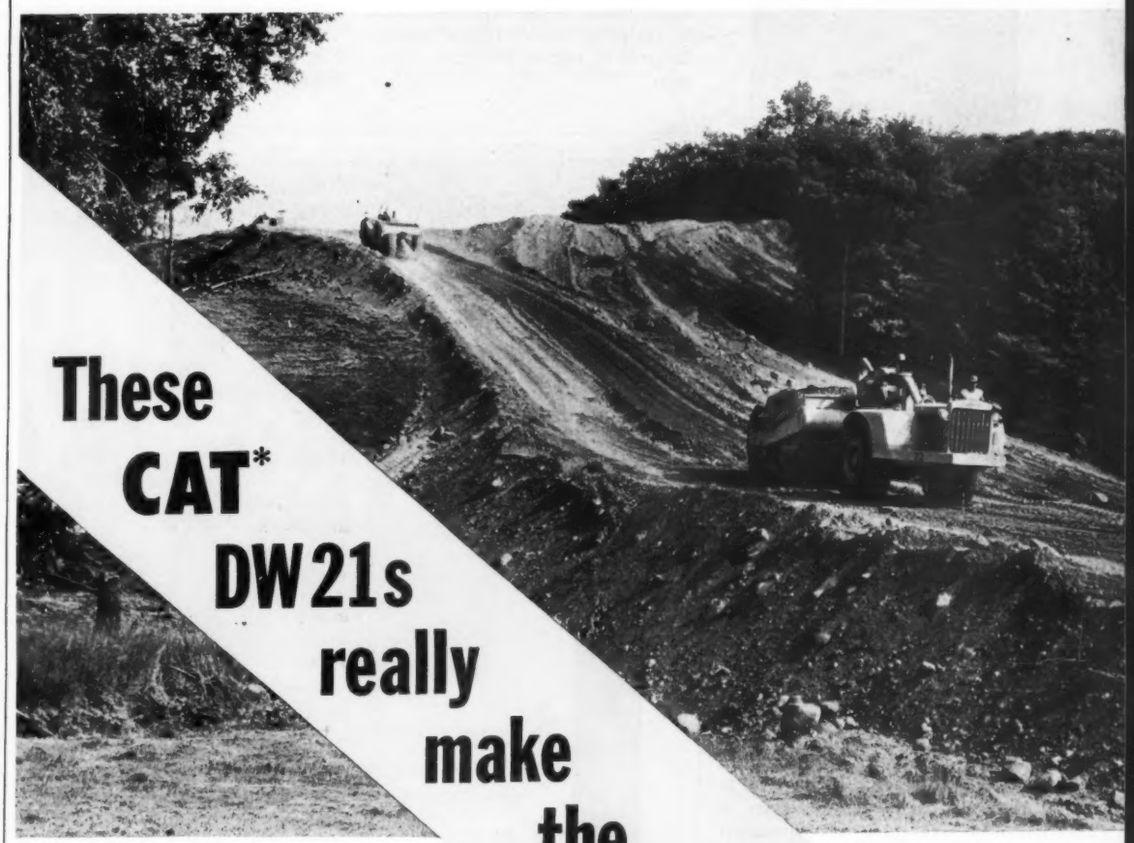
Heading the southwest district is A. C. Quinn, who will be responsible for sales activities in Texas, Louisiana, Arkansas, Oklahoma, Colorado, New Mexico, and Arizona. Mr. Quinn's headquarters will be located in San Antonio, Texas.

N. H. Bogie will represent Diamond in the south, covering the states of Delaware, Maryland, West Virginia, Virginia, Kentucky, Tennessee, North and South Carolina, Mississippi, Alabama, Georgia, and Florida. He will work from his Gilbertsville, Ky., headquarters.

Galion Representative

The Galion Iron Works & Mfg. Co., Galion, Ohio, has appointed Daniel Penkoff as southwest district representative in charge of motor graders and rollers. His territory includes California, Arizona, Nevada, Colorado, New Mexico, and southwestern Texas, and his headquarters is at 3273 Mount Curve Ave., Altadena, Calif.

Mr. Penkoff's predecessor, W. A. Beale, has returned to the company's main office.



These CAT* DW21s really make the grade

THAT'S a 28% grade these Caterpillar DW21 Tractors with No. 21 Scrapers are working.

They're starting an 85-foot cut through sandy clay and boulders. The DW21s load on the level, haul downhill, then scoot back up that slope for more.

"A steep grade like this is certainly a tough tryout for any rubber-tired machine," says Oscar Lindstrom, superintendent for Victor Nelson Construction Company, "but those DW21s take it in stride. They're about the best earthmovers you'll find on rubber."

Here, southwest of Slinger, Wisc., constructing a new grade and right-of-way for U.S.-Wisconsin No. 41, each of four Cat DW21 Tractors is moving 250 yards an hour—830,000 yards in all. "They handle a great deal of payload in a day," says Superintendent Lindstrom.

Other users say much the same. One reason: the DW21 is the only two-wheel earthmover designed and built by one company—every part *matched* to deliver peak performance on the job.

Another: its 225 HP is all there at the flywheel. As Mr. Lindstrom points out, here's one rig that won't smother on grades.

And a third reason: always handy with prompt, genuine parts service is your Caterpillar Dealer. He'll be glad to demonstrate this high-speed, high-capacity, big yellow machine any time you say.

Caterpillar Tractor Co., Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

L620.51
C783

NAMES IN THE NEWS

C. H. Buckius, who has retired as chief engineer of the Pennsylvania Department of Highways.

Veteran Pennsylvania Highway Official Retires

C. H. Buckius, chief engineer of the Pennsylvania Department of Highways, has announced his retirement to accept a position as engineering representative with Lehman Bros., New York, N. Y., investment banking firm. His retirement concludes a career with the Pennsylvania department dating back to 1907.

Beginning as a chainman on a surveying corps at the age of 15, Mr. Buckius remained with the highway department for two years, whereupon he left to complete his education. He rejoined the Pennsylvania organization in 1912, and worked up to the position of district engineer. From 1935 to 1939 he again was absent from the department, but he returned to the state highway organization 15 years ago as assistant secretary of highways. He had been chief engineer since April, 1952.

During recent years, he has had an important part in such developments as the Lincoln Parkway, the Schuylkill Expressway, numerous other main-artery projects, and countless rural road improvements.

W. N. Carey Retires As Secretary of ASCE

After 10 years as executive secretary of the American Society of Civil Engineers, Col. William N. Carey will retire May 1. He will be succeeded by William H. Wisely of Champaign, Ill., but will have the title of secretary emeritus.

A member of ASCE since 1916, Col. Carey served at one time as chief engineer of the Federal Works Agency and is a former city engineer of St. Paul, Minn. He served as an officer in the U. S. Army Corps of Engineers during both world wars, and is coauthor of the manual "Military Roads in Forward Areas", a text used extensively by military engineers in World War II and the Korean war.

His successor, Mr. Wisely, is executive secretary of the Federation of Sewage and Industrial Wastes Associations and editor of its publication, *Sewage and Industrial Wastes.*

New Kuljian Representative

The Kuljian Corp., engineering and contracting firm of Philadelphia, Pa., has appointed Dr. Jaime Fonrodona home office representative in the Caribbean area. His headquarters will be in Caracas, Venezuela.

For several years, Dr. Fonrodona was assistant to the general manager of SNIACE, Spain's largest manufacturer of viscose fibers for alpha pulp.

Alfred E. Johnson, new executive secretary of the American Association of State Highway Officials.

New AASHO Secretary Johnson Begins Duties

His new duties as executive secretary of the American Association of State Highway Officials have been taken up by Alfred E. Johnson, immediate past president of the AASHO. His appointment, effective the first of this month, filled the vacancy left by the resignation of Hal H. Hale.

Mr. Johnson has had wide experience in both engineering and public relations. Chief engineer of the Arkansas State Highway Department at the time of his new appointment, he had served continuously with that highway department since 1927. He is a member of several engineering and highway organizations.

Mr. Hale has accepted a position with the Association of American Railroads.

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Walsh and Jansen Win Moles' Annual Awards

The annual awards given by The Moles for "outstanding achievement in construction" have been won by Thomas J. Walsh, chairman of the board of Walsh Construction Co., New York, N. Y., and Carl B. Jansen, president of the Dravo Corp., Pittsburgh, Pa. Their acceptance of the awards at the Waldorf-Astoria next month will make the men the 15th pair of winners in a series that numbers among its other recipients former President Herbert Hoover and Robert Moses.

Considered the highest recognition of service to the American construction industry, the award is granted to one member and one nonmember of the tunneling and heavy construction society. Mr. Walsh is this year's member winner.

Thomas J. Walsh

Carl B. Jansen

President of the Walsh firm since 1916 and chairman of the board since 1946, Mr. Walsh is a graduate of St. Mary's College, Kansas. The company has driven numerous tunnels throughout the country, including the Queens-Midtown tunnel in New York, and is currently completing 26 miles of tunnels from the Catskill Mountains to New York City.

Mr. Jansen has been with Dravo since 1922 and in that time has been in charge of such projects as the East Bay crossing of San Francisco Bay Bridge, Philadelphia subways, and a section of the Delaware River Aqueduct.

New Commanders Named By Corps of Engineers

Brig. Gen. Louis W. Prentiss, formerly engineer commissioner of the District of Columbia, has been appointed to command the Engineer Center, Fort Belvoir, Va. He will be succeeded as engineer commissioner by Col. Thomas A. Lane.

As commanding general at Fort Belvoir, Gen. Prentiss will be responsible for the engineer school, the engineer research and development laboratories, the 79th engineer group—a construction group—and the engineer center regiment. In addition, he will be in charge of the army hospital at the fort and of Davison Air Field. In all, Gen. Prentiss will be in command of more than 15,000 troops. He has been connected with the U. S. Army Corps of Engineers since 1929.

The new engineer commissioner of the District of Columbia, Col. Lane, has served as district engineer at Little Rock, Ark., and has held important planning and construction posts in civil works projects. During World War II, he served with the engineer staff at General Headquarters, Southwest Pacific Area, and holds the Distinguished Service Medal for his performance of duty there.

AISC Elects Officers

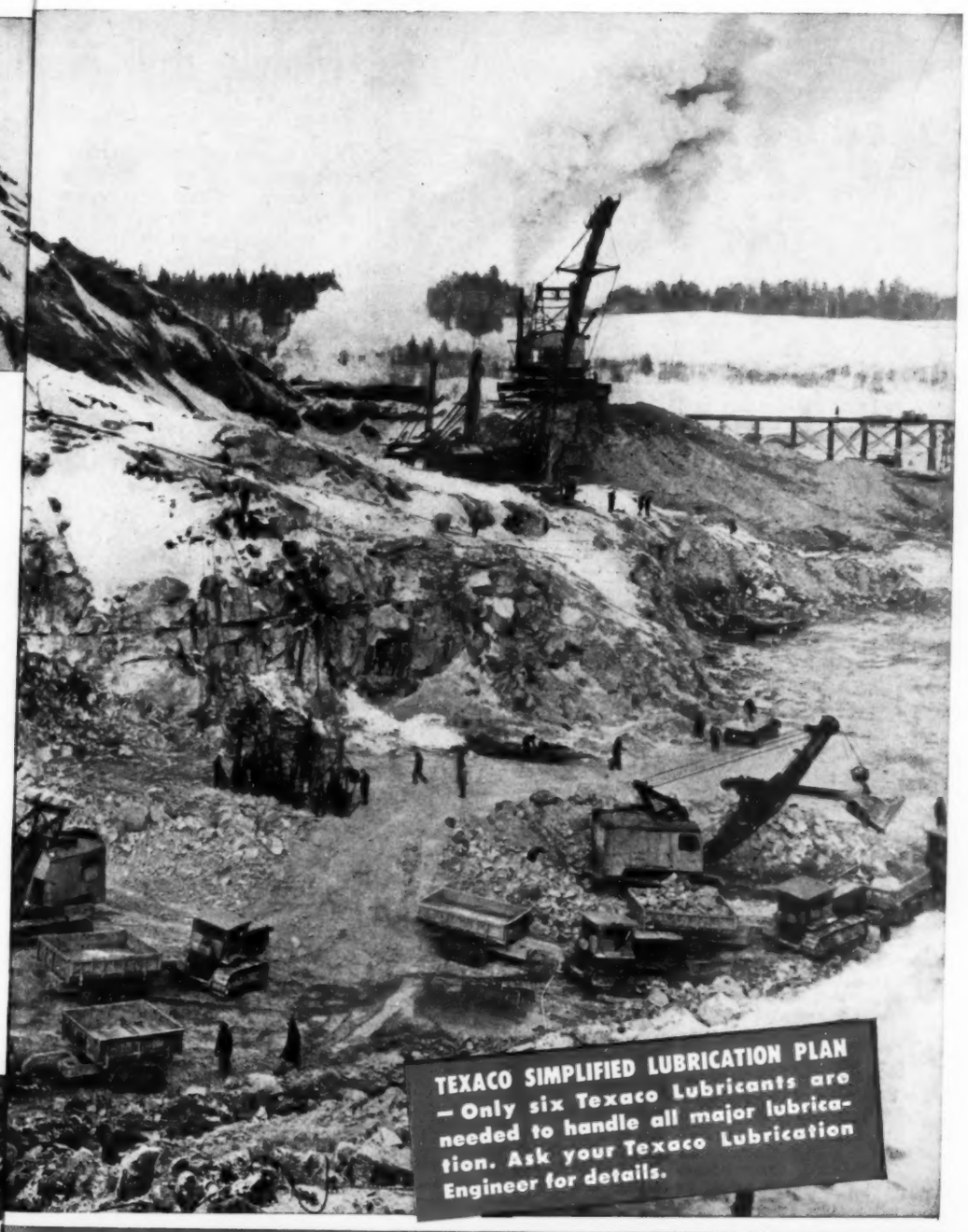
Elections held at the close of the 32nd annual convention of the American Institute of Steel Construction in White Sulphur Springs, W. Va., have resulted in the election of Earle V. Grover, president of the Apex Steel Corp., Ltd., Los Angeles, Calif., as president. He succeeds John E. Jackson. L. Abbett Post was re-elected executive vice president.

Other officers elected are N. P. Hayes and H. Buckley Dietrich, first and second vice presidents, respectively, and M. Harvey Smedley, secretary. James M. Straub, was re-elected treasurer. Nine directors were elected to serve until 1957 on the 27-man board.

Hernandez Elected as Turner Vice President

Clinton N. Hernandez has been elected a vice president of the Turner Construction Co., New York, N. Y. A member of the Turner organization since 1942, he served as resident project manager for the company's operations at Oak Ridge, Tenn., and from 1948 to 1951 was general supervisor of that project.

In his new position, Mr. Hernandez will continue to be in charge of special projects. Previously, he was in charge of construction for the White Pine Copper Co., White Pine, Mich.; Bethlehem Mines Corp., Marmora, Ont., Canada; and titanium facilities for Cramet, Inc., at Chatanooga, Tenn.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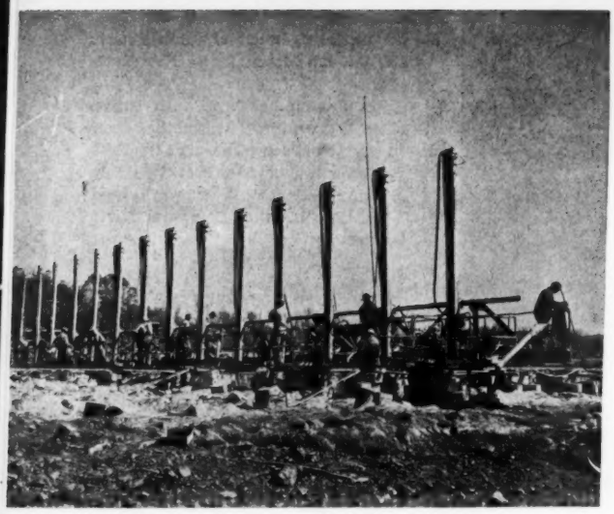
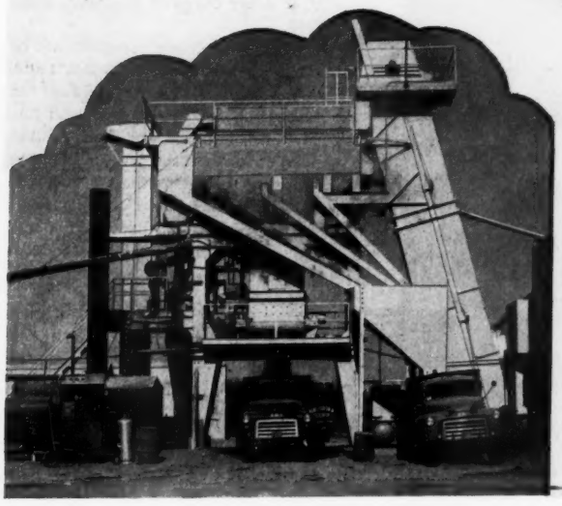


Workmen prepare to drill 24-foot-deep holes with this traveling gang drill. Fourteen Gardner-Denver drills are mounted on a steel frame bridge which rides aluminum rails.
C&E Staff Photos

A Marion 151-M 7-yard electric shovel loads one of the waiting Euclid end-dump trucks in the deep tailrace channel.

...when buying an asphalt plant

CONSIDER THESE 2 POINTS



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Mobile drill jum

A CONTRACTOR-DEVELOPED gang drill that mounts fourteen rock drills and propels itself on aluminum rails is making a fast job of blasting the 8,000-foot-long tailrace channel at Roanoke Rapids Dam in North Carolina.

Central Engineering & Contracting Corp., Durham, N. C., had to drill, blast, and remove approximately 1,300,000 cubic yards of rock from the bed of the Roanoke River to make one of the longest and deepest tailrace channels in the country. This work, to be completed early this year, is being done under Central's superintendent, K. M. Quigley. Central is subcontractor for Stone & Webster Engineering Corp., Boston, Mass., general contractor on the $34 million hydroelectric development. Virginia Electric & Power Co. is the owner.

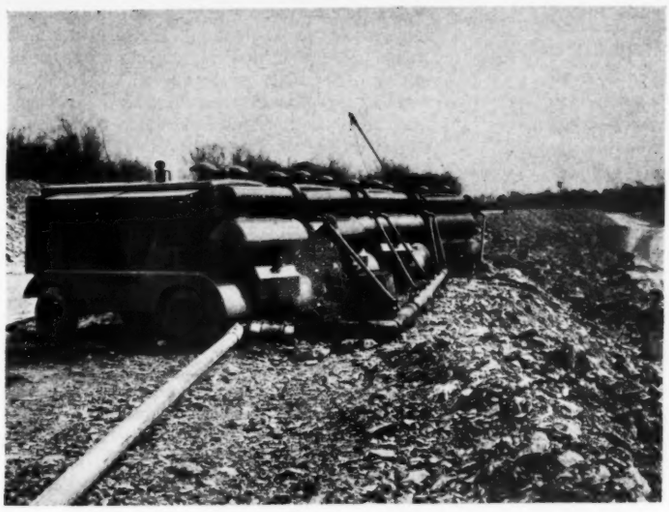
The massive tailrace channel is 80 feet wide at the bottom and varies in depth from 55 feet at the powerhouse to 30 feet at the downstream terminus. Tailraces are always cut as deep as is economically possible to achieve maximum head, and at Roanoke Rapids, the unusually large fall of the river below the dam site makes it feasible to excavate exceptionally deep.

Drilling

Central engineers knew that drilling the top lift would be difficult because of the very irregular surface of the drained riverbed. It would have been almost impossible for ordinary wagon drills to maneuver over the maze of boulders and mud holes.

After considerable investigation, the contractor decided on a steel drill bridge that could ride on lightweight rails just high enough above the ground to miss the surface irregularities. A rig was made, the frame of which consists of three sections of 30-foot rolled steel members bolted together. Fourteen Gardner-Denver drills are mounted on a 3-inch pipe attached to the main frame with six angle braces. Each drill, plus the operator's platform, can be moved back and forth on the pipe to adjust hole spacings.

After each line of holes is drilled,



Compressed air, supplied from this battery of Chicago Pneumatic 600-cfm compressors, is fed to the drills through a 6-inch Alcoa aluminum pipeline.

Raymond Concrete Pile Promotes Executives

The Raymond Concrete Pile Co., foundation and construction firm of New York, N. Y., has made two appointments within the organization.

G. William Bailey has been promoted to the position of chief engineer of the firm. Formerly chief estimator, Mr. Bailey succeeds Warren N. Riker, who has been assigned to the Boston office. During his 14 years with Raymond, Mr. Bailey has served as project engineer on high-priority construction jobs, and recently has directed construction preparations in this country and abroad.

Appointed to the position of controller of the firm is Winfred C. Bloom. Assistant treasurer of the company since 1952, Mr. Bloom will also continue in that post.

jum eeds blasting

three air tuggers pull the rig 6 feet forward on six lightweight aluminum rails supported on wood blocks. Holes are drilled 24 feet deep with 6-foot lengths of steel and 2½-inch Rok-Bits with carbide inserts. Air, supplied by a battery of seven Chicago Pneumatic 600-cfm compressors, is fed to the drill rig through an Alcoa aluminum 6-inch pipeline.

The use of 40 per cent gelatin dynamite is producing a dynamite factor of 1.0 to 1.2 pounds per cubic yard. A shot covering 8 to 10 lines of holes is made every day.

Central started working the drill bridge at the powerhouse end of the tailrace and gradually moved it downriver. At the same time, a Northwest 80-D shovel was brought in to build a chain of about 16 clay and rock cofferdams between the islands in the river. This diverted the river into the natural riverbed on the north side of the tailrace.

Excavating

As soon as the cofferdam dikes were completed, Central unloaded the components of a 7-yard Marion 151-M shovel from six flatcars. The big unit was assembled next to a siding about 2 miles below the dam and walked over the dikes to the powerhouse end of the tailrace. This was the only way to get the shovel to the site.

With the 7-yard unit at its peak, production is averaging about 400 yards per hour. The material is hauled out by a fleet of Euclid end-dump trucks carrying 22 tons heaped. Most of the rock is used to build dikes on each side of the tailrace to protect against flood conditions in the river. Sections of the tailrace are left temporarily unexcavated every 1,200 feet to provide truck ramps.

On the second and third lifts the contractor uses a battery of wagon drills supplied with air from portable compressors. Lightweight Alcoa aluminum pipe sections connected by Quick-Lok couplings run from the compressors to the drills. The ease with which the pipe can be handled and coupled helps to speed the drilling work. THE END

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Money Matters

by WILLIAM HURD HILLYER

Outlook is good for industrial construction, public works; banking development promises to free more working capital

Whims of a buying public may cause cycles in the vast market for consumer goods—including private dwellings—but the type of construction dealt with in this magazine is governed primarily by financial conditions, and only indirectly by public demand. Various aspects of financial matters affecting construction will be appraised in this department month by month to assist contractors and engineers to plan their operations on a sounder basis. Their prosperity promotes the nation's as well, for construction is one of the foundation stones in the country's economy.

This department will seek banking opinion, not merely because it is the hub of the money market, but because it has become closely integrated with construction through bond investment and equipment financing. Both of these vital areas will be currently examined. In addition, general economic factors will be evaluated from a non-technical standpoint.

Construction Work: As the year takes its first stride forward, big bankers find the construction outlook good. The senior vice president of New York's largest bank feels increased construction of commercial facilities and public works, concurrent with capital spending by industry, to be in the offing. He and others in similar positions believe that the downward curve in national volume of manufactures is beginning to level off. They point to the fact that industrial production is already rising—the Federal Reserve index being 12 per cent above the July low. Furthermore, the output per man-hour is increasing twice as fast as the long-term 2 per cent yearly average. A new middle-income market is opening up as average earnings rise and as population grows by some 3½ million a year.

Increased Manufacturing: Corporations will require more factory and office space to take care of growing business this year. There's solid foundation for such optimism, viz:

(1.) Unemployment is down 40 per cent from the January, 1954, high.

(2.) Manufacturing sales are up around 3 per cent—the first increase since the middle of 1953.

(3.) Profits before income taxes increased 9 per cent over 1953 for latest reported period in 1954.

(4.) Bank check activity—the rate at which depositors use their checking accounts—shows an average increase of 10 per cent over last year.

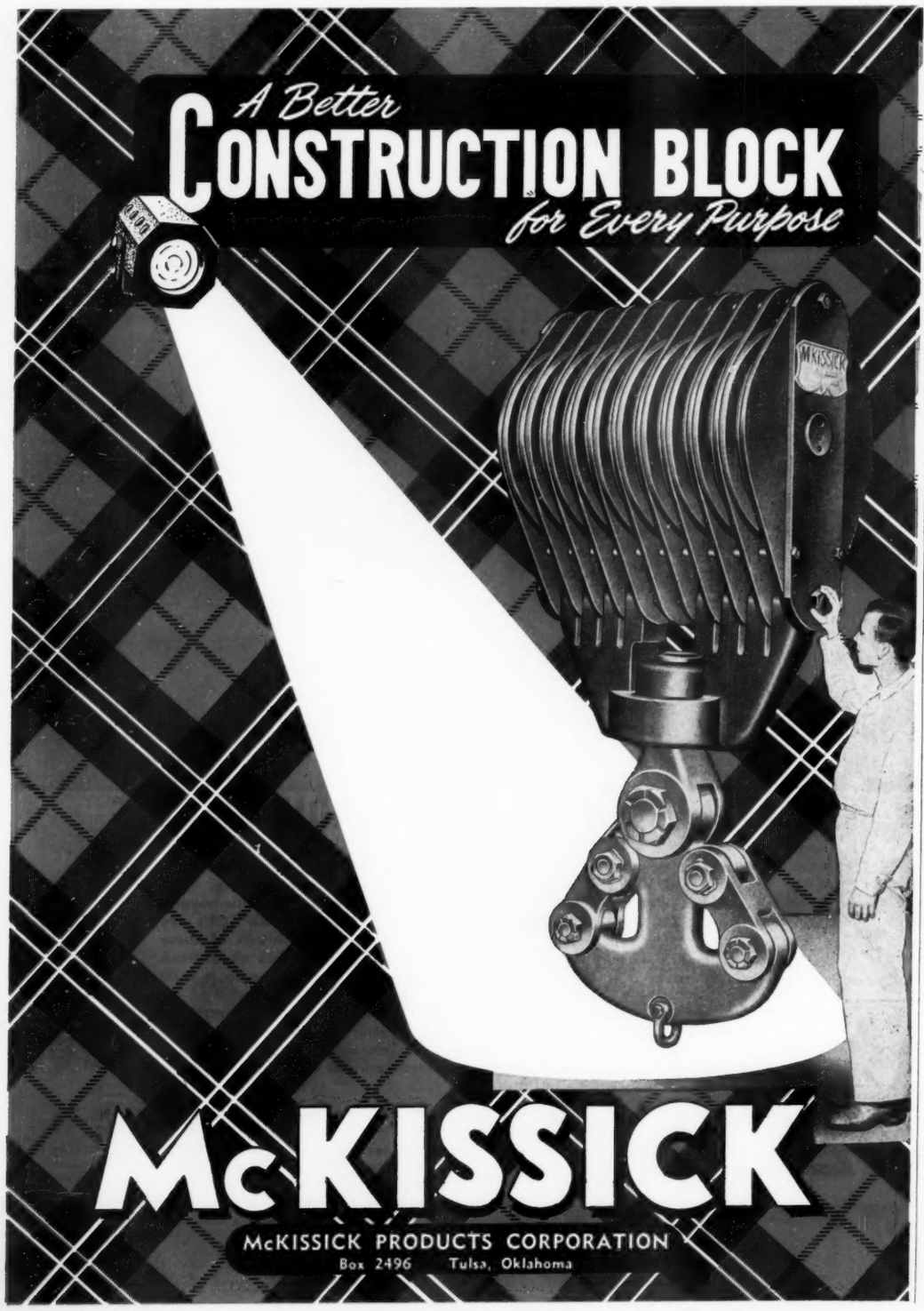
(5.) Loanable funds are abundant. Net excess reserves held by the country's banking system increased from $700 million to nearly $1 billion during October and November, partly as a result of the continued "easy money" Federal Reserve policy. Short-time money rates are low—around 1¼ per cent for federal funds during seasonal rise and 2 per cent for commercial borrowings.

(6.) Commercial banks are lending to small and medium-bracket business as never before. Small Business Administration has touched the $60 million mark.

(7.) Consumer spending is at a new high—about one billion dollars above last year—even though sales of E and H savings bonds are setting a 9-year record.

Analyses by the savings and mortgage division of American Bankers Association show that savings are growing more rapidly than mortgages. The ratio is 400 per cent since 1940, compared with 300 per cent for realty loans. All this indicates a healthy accumulation of capital at ground level.

An important if indirect source of construction money is reinvestment



of corporate dividends. These are being distributed at an $8 billion annual rate, more than 7 per cent ahead of last year, according to official estimates. Proceeding at precisely the same pace, according to the same authorities, is the total increase in construction. Schools, with a 21 per cent upswing, top all categories.

Public Construction: Work of every sort in this field is lit by rosy horizons. Credit this to the excellent municipal bond performances during the closing quarter of last year and the large tentative market laid out for the first two months of 1955. Although mid-December saw the flotation of $225 million in municipal and state authority obligations, the year closed on a note of caution induced by bond accumulations on dealers' shelves. This feeling did not produce much mark-down of prices, however, the average holding well above 93 and Daily Bond Buyer indices remaining steady. Nor did it prevent some $800 million in new issues from being scheduled for this month. Judging by the year-end performance, they will doubtless be absorbed quickly.

For the current twelve-month outlook period, public securities should remain strong. Municipal bonds, being tax exempt, will continue in good demand. This prediction of securities experts is based on the fact that higher Federal tax rates are a probability in the months ahead.

The municipal stage has of late been supporting a weekly average of more than $100 million long-term offerings, despite the absorption of various quasi-federal issues, plus a billion-dollar C. C. C. crop pool. When, therefore, the U. S. office of Education envisions work starting on 250,000-room school facilities and new hospitals, it is not harboring any dreams that cannot be realized in 1955.

Equipment Financing: This has been enlivened by the appearance of a new character—the "professional lessor", who buys equipment and leases it to users. One such lessor, a Pacific coast corporation, is active nation-wide and is well regarded by banks. Another, headquartered at New York and specializing in contractors' equipment, reports its business doubling every 90 days. Some of the major finance companies—notably the C. I. T.—are going extensively into equipment and machinery financing, both by lease and installment plans handled directly and through dealers. Such activities will benefit contractors, make it easier for industry to expand, and assist heavy construction. Altogether, contractors will find 1955 an easy financing year.

Reason for Optimism: As a whole the financial picture is cheerful, though it does have some dark spots. The most threatening are federal, state, and local debts, now at an all-time high and still rising. In the first half of last year, corporate net earnings after taxes were down 10 per cent from the 1953 period. Despite this, there is cause to be optimistic, for one of the "big-three" banks avers that business has been gathering strength for a new upward move.

New Development: An unpublicized banking procedure, still in its infancy, has tremendous possibilities for business and is particularly intriguing to engineers because of its mathematical aspects. Banks have found a way to reduce, if not eliminate, the revolving sum tied up in uncollected items. This procedure will result in automatically increasing the cash balances of business concerns or large corporations which have an income largely in the form of checks from various points. A top-bracket New York bank, specializing in "remittance" technique, reports that the development increases typical balances of certain depositors up to 40 per cent, all without any borrowing. No slide-rule is required to show that this percentage means billions in additional working capital for expanded industrial facilities and new construction. THE END

William Hurd Hillyer, both a writer and an economist, has combined these two occupations to become a well known interpreter of the financial world. He began writing for the Atlanta newspapers more than 50 years ago, and this work subsequently led to his becoming Atlanta correspondent for the Wall Street Journal. Meanwhile, he served as a bond broker and an officer in investment and banking establishments. In addition to being the author of "Keys to Business Cash" and co-author of "America's 50 Foremost Business Leaders", he has been a contributing editor for Forbes Magazine of Business and has written numerous financial articles for various publications.

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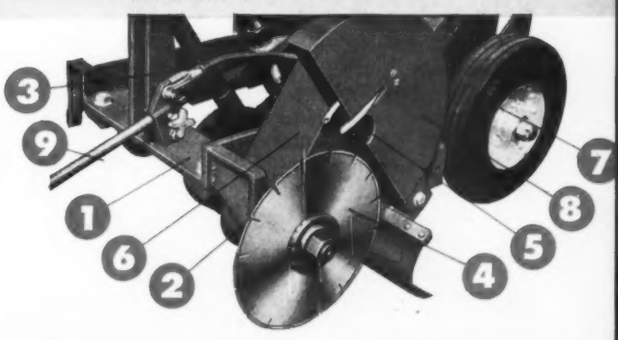

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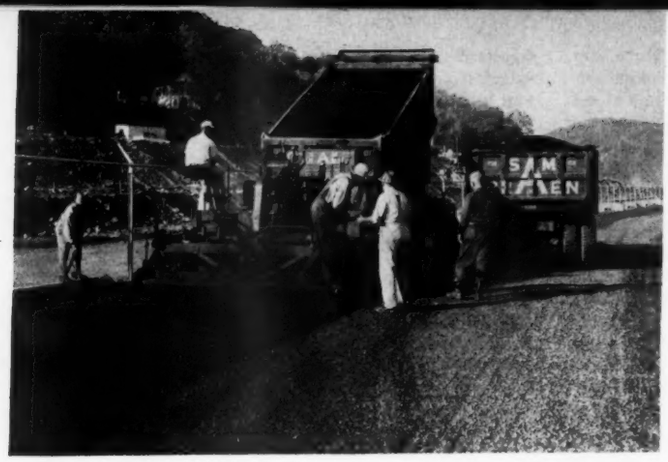
Tight schedule accelerates paving of parking field



The 1½-inch surface course of asphaltic concrete is put down on the parking field by a Barber-Greene finisher. Braen's six-man paving crew kept production at an average of 620 tons daily.

C&E Staff Photo

Enough bituminous material to pave a 27½-mile stretch of 18-foot roadway has gone into the employee parking area at the newest assembly plant of the Ford Motor Co. now under construction at Mahwah, N. J.

Bigness characterizes the entire plant. Sprawling over a 177-acre site at the New York-New Jersey state lines, the plant is expected to start turning out cars and trucks later this year.

For the 250,000-square-yard parking field, a total of 21,000 tons of hot-mix was required. An additional 8,000 tons of bituminous concrete was needed for the 50,000 square yards of road which runs around four sides of the plant. This roadway will facilitate delivery of materials to several parts of the plant and permit fast and efficient shipment of finished products from the plant.

The 63-acre paving job for both parking lot and roads was done by Samuel Braen Construction Co., Wyckoff, N. J.

The parking field, located between the plant and State Route 17, consists of a 1½-inch asphaltic concrete surface over a 4½-inch base of crushed stone. The 9-inch-thick pavement around the plant consists of two 3-inch courses of stone, topped by two 1½-inch courses of asphaltic concrete. Paving width averages 22 feet.

Prior to paving, Braen moved in early in June to grade the site, and install necessary drainage structures. This earthwork was done by a Caterpillar and an Austin-Western grader, Caterpillar D8 tractors with dozers, and a fleet of 20-yard Euclid scrapers and LeTourneau scrapers.

Base Course

As the area was brought to grade, stone for the base courses was trucked to the site from two quarries owned and operated by the contractor. Stone for both road and parking lot had the following gradation:

Sieve size	Coarse	Fine
2½-inch	100	
2 -inch	90-100	
1½-inch	35- 70	
1 -inch	0- 14	
½ -inch	0- 5	100
⅜ -inch		85-100
No. 4		10- 30
No. 8		0- 10

The 4½-inch-thick crushed-stone base for the parking area was put down by a Blaw-Knox stone spreader and compacted to 4½-inch thickness by a Galion 3-wheel roller. Stone chips were used to fill the voids, and the base was rolled and penetrated

Down time is no joke. The best way to avoid it is to insist on *genuine* CAT* parts every time. That's the only way to be sure of getting parts that are made to the latest design, precisely manufactured of the right materials, rigidly inspected and tested.

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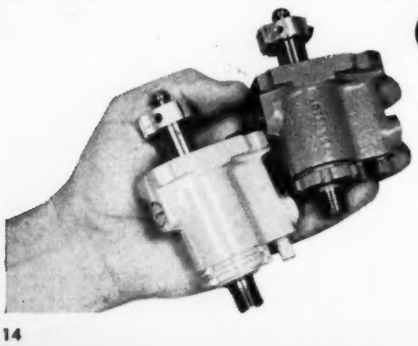

An Austin-Western steel-wheel roller follows the finisher to compact the top course. In the background, a road that will lead into the field from State Route 17 is graded.

Final compaction is provided by a Buffalo-Springfield roller. The completed 250,000-square-yard field will provide parking space for about 3,000 cars at the new Ford plant.

C&E Staff Photos

with grade OA4 asphalt. Penetration went to a 2½-inch depth, with an application of 1.6 gallons per square yard. Two courses of stone were laid for the roadway. The first was a 3-inch lift of 2½-inch stone, topped with 3 inches of 1½-inch stone. This was penetrated with OA4 asphalt at a rate of 1.6 gallons per square yard. The top layer, in each case, was primed with 0.1 gallon of RC-2 per square yard.

The hot-mix for the surface course of both parking lot and roadways was produced in Braen's plants at Haledon, 10 miles from the site, and at Hawthorne, 12 miles distant. Asphalt for the job was supplied by The Texas Co. from Bayonne, N. J.

Steady Paving

The contractor's fleet of 10 to 14-yard Autocars, Macks, and Whites hauled the mix to the site, maintaining a schedule that kept a Barber-Greene finisher working almost continuously.

A Huber 10-ton steel-wheel roller kept close to the paver and was followed by a Buffalo-Springfield roller. The chief difficulty for the Huber in the compacting operation was in maneuvering at the edges of the parking area, where posts had been erected for stringing a Cyclone fence. The extreme edge of the lot was compacted by hand tampers.

A six-man crew, working an 8-hour shift, kept average production at 620 tons daily. The highest production record—887.4 tons in a 10-hour shift—was made as the contractor pushed production to finish the job before cold weather brought the operations to a stop.

Roads leading into the parking lot from State Route 17 will be constructed by Union Building & Construction Corp., Passaic, N. J., under a contract from the New Jersey State Highway Department.

Personnel

Arthur Kreiger, vice president of Samuel Braen Construction Co., was in charge of the project for the company. Harry Evans was general superintendent and Tom James was superintendent of the paving work. R. H. Harris and Meyer Niden, both of the Pittsburgh Testing Laboratory, were field inspector of paving and laboratory technician of bituminous mix, respectively, for the Ford Motor Co. Kenneth B. Lockhart was resident engineer on the job for Ford.

THE END

Manitowoc 2000
dives for dollars

here are the "2000" features:

Faster Working Cycles
Faster hoist speed—swing speed

•

Efficient—Economical
Simple design—only 13 working gears

•

Greater Capacity
(45 ft. crane boom—50,000 lbs.)

•

Easily Converted
Shovel—Dragline—Crane—Hoe

•

Less Ground Pressure
6.9 to 13.0 lbs./sq. in.

•

Long, Wide Crawlers
12'4"—14'7"—16'10"

EVEN THOUGH it's up to its "travel shaft" in water—this Manitowoc 2000 is packed with profitable action! Assigned to handle the toughest part of a $250,000 Washington State Highway Commission job for Cherf Brothers near Kennewick, Wash., this Model 2000 is slugging it out with rocks, boulders, clay, sand, gravel *and water* at the rate of 1000 yards per shift, sometimes working around the clock. Frequently this 1¼ yd. rig has to submarine its oversize bucket to a depth of 9 feet under water to get its load!

A smooth functioning torque converter reduces load shocks and boosts operating efficiency. Jaw-type steering clutches and travel gear are fully enclosed—protected from water and dirt. These are the Manitowoc features that permit this kind of wet going.

Got a tough job? Let a Manitowoc take a crack at it—take your operation out of the "red" and end up each shift in the "black".

Manitowoc Engineering Corp.
Manitowoc, Wisconsin

MANITOWOC
SHOVELS 1-5 YD. Speed Crane CRANES 18-100 TON

Lumber mattress which will be put down to protect the bottom of the river channel from scour is woven by workmen on a barge. The green 1 x 4 lumber is nailed and wired together at all intersecting points. The wood piles serve as a weaving platform.

C&E Staff Photo

Pile dikes and riprap control bank erosion

BOARD MATTRESSES and crushed-stone blankets may sound like nothing more than poor sleeping facilities. But, when some riprap and pile dikes are added, they represent bank and channel control on the lower Arkansas River. Under supervision of the Vicksburg, Miss., District of the U. S. Army Corps of Engineers, pile-dike bank revetments are being constructed along the river in an area known as the New Gascony reach and located a short distance below Pine Bluff, Ark. Contractor for the work done during the 1954 season was Yancey B. Turner, Pine Bluff.

In flood periods, the unruly Arkansas River has a habit of cutting deeply into its sandy banks. Then, as the floods recede, the sand is spread over an ever-widening river bottom in such a way that the normal channel is all but obliterated. Sand bars form and are soon covered with a dense growth of willows and other brush which will obstruct high water flows. When the floods come again, the water is pushed against a vulnerable bank. It digs into the sand, and the process is repeated. To hold the present bank lines and confine the normal flows to a normal channel, especially where levees, bridges, and utility crossings are jeopardized, are the goals of the present bank-stabilization construction program.

The area along the river where construction is now under way was undeveloped and lacking in roads, so Turner's first job was to get easements and build a road to the job site. Clearing, grubbing, and dressing up of the present river banks followed. Merchantable timber became the property of the adjacent land owner, and a local timber man was engaged to cut and haul it. Turner then moved in a Bucyrus-Erie 54-B dragline with a Bucyrus-Erie 2½-yard bucket to grub the stumps from the riverbank and grade the bank to a 3 to 1 slope. A Caterpillar D6 with dozer leveled out the spoil bank thrown up by the dragline, shaping it into a neat berm which served as a roadway during the construction period.

Board Mattresses

At locations where pile dikes were to be constructed, a board mattress was first placed in the river bottom and weighted down with stone. In one typical case the mat was 77 feet wide and extended out from the bank 831 feet in one continuous piece. Green native hardwood lumber, sawed to 1 x 4 dimensions in lengths ranging from 8 to 16 feet, was obtained from local sawmills and trucked to the site where the mattress was being woven. Here, the Bucyrus-Erie crane lifted the loads of lumber with slings and placed them on a lumber barge in the river. Three barges, measuring

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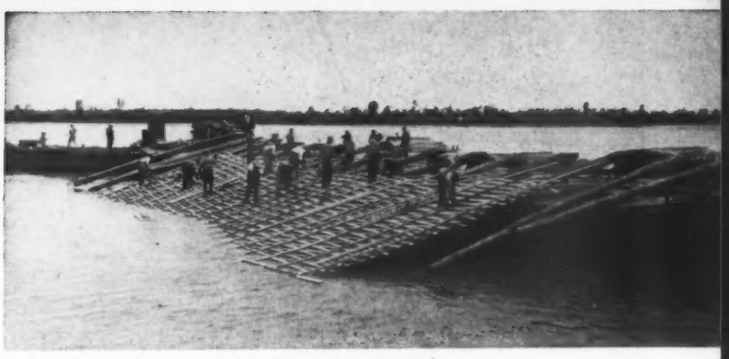
Woven board mattresses and crushed stone are placed on river bottom and banks to help prevent scour



During the weaving process, the mattress is supported on inclined timbers which extend over the side of the barge. As the mat is woven, the barge is moved outward from shore, allowing the mattress to slide off the timbers and settle to the river bottom.

C&E Staff Photo

26 × 92 × 6 feet, were used for transporting the lumber.

The towboat William W. McCall, powered by a GM 671 diesel engine, towed the lumber barges out to the mat barge where the actual weaving took place. This towboat also handled a 30 × 110 × 7-foot barge used for hauling rock. Between times it served as crew change boat and ferried supplies and equipment from shore to the crews afloat.

On the 30 × 115-foot mat barge, sections of wood piling were arranged so that they extended over one side of the barge and down into the water to form a sloping platform on which the mattress was woven and launched. These piles were spaced about 8 feet apart. Longitudinal members of the mattress, called fingers, were spaced at 4-foot centers across the complete width of the mat. Cross members, called mat boards, were woven under and over alternate fingers and were spaced 4 inches apart, which is standard spacing in foundation mattresses for pile dikes. This is called a 4-inch weave. Where each mat board went under a finger, the two were nailed together with a 10-penny nail. Fingers were lapped 3 feet for splices and the ends of both pieces were nailed with 10-penny nails. Mat boards were lapped 18 inches on splices. All splices were also tied with wire.

Two cover boards were nailed over the fingers after the weaving, and these were nailed all the way through with a 20-penny nail where each mat board went over a finger. At 20-foot intervals a cross binder consisting of three pieces of 1 × 4 was attached to the mattress parallel with the mat boards. The cross binder was nailed with a 40-penny nail to each finger, tied to the mattress with No. 9 wire, and further secured by a 9/32-inch wire-strand cable. The cable was wrapped around mat boards, fingers, and cross binder, making a complete turn every 4 feet of the cross binder. Each turn was drawn tight and stapled with a 4-inch staple.

As the portion of the mattress on the barge was completed, the barge was moved out from the shore, letting the completed portion slide down the launching platform into the water. The weaving then continued, and this process was repeated until the entire mattress had been woven. The green hardwood lumber sank immediately to the bottom of the river and was later weighted down with three-fourths of a ton of riprap stone per 100 square feet of mat.

Driving Pile Dikes

For driving the piling, Turner brought in a Northwest crane with 60-foot swinging leads. A strut apron connected the bottom of the leads with the crane. A Vulcan No. 2 steam hammer was supplied with steam from a 25-hp oil-fired upright boiler mounted on the fantail of the crane. This self-contained rig walked right out on the board mats to drive the pile dikes.

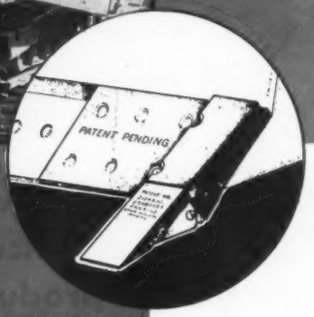
Inshore portions of the dike were

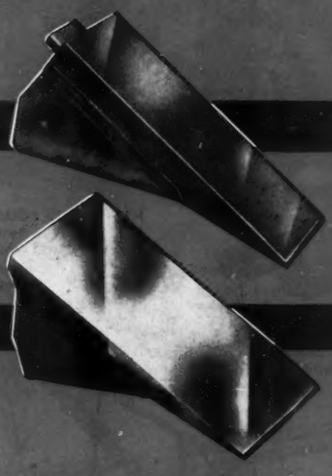
(*Continued on next page*)

Teeth that really dig

BULLDOZER CORNER ADAPTERS

Increases efficiency — Corner points stay sharp — Eliminates round corners — Point pilots ahead of blade, reduces wear on blade — Maintains slope in cuts, keeps bulldozer in line.





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PIONEER MANUFACTURERS OF TWO-PART TEETH FOR EXCAVATING EQUIPMENT

Dealers located in strategic points to insure prompt service

Rock shipped by rail from a quarry is trucked to the site in dump trucks. Here the riprap is being distributed on the sloping bank by backing the truck over the bank. A cable attached to a tractor holds the truck and pulls it back up the bank.

C&E Staff Photo

(Continued from preceding page)

made of untreated cypress piles in lengths from 28 to 45 feet. These were obtained from local sources. It was assumed that the inshore reaches of the dike would gather enough sand and debris to be covered in 3 or 4 years. This piling will then have done its duty and it will not matter particularly if it begins to rot.

Farther out where the piles may have to stand for a number of years, treated pine piles in lengths from 45 to 59 feet were driven. Piles were driven in clumps on a line approximately perpendicular with the shore where the board mattress had previously been laid. The piles were driven through the mattress, and this in some cases damaged the mattresses rather severely. To insure the integrity of the mattress after piles had been driven through it, 4 tons of riprap were dumped into the dike line at each clump of piles. In order to make a rigid clump, the piles were driven vertically, spaced 3 feet apart. The shorter lengths were driven to 20 feet penetration, and the longer treated piles penetrated 30 feet below the river bottom. When the clump had been driven, the tops of the piles were pulled together and securely tied with seven wraps of 3/8-inch wire strand pulled tight by a pulley drum on the crane. Each wrap of the cable was nailed off with a 3/8 × 6-inch boat spike. Stringer piles were then tied to the clumps. These timbers from 36 to 65 feet in length, were attached to each clump with three turns of 3/8-inch cable.

Riprap for the sloping banks consisted of quarry rock graded from 10 to 150 pounds. Slopes were first covered with a crushed-rock blanket consisting of 4 inches of crushed stone graded from 4 inch down to No. 4. Ten inches of the larger stone was then placed over the blanket. Stone was shipped from a quarry in Little Rock, Ark., by rail to a siding at Noble Lake about three miles from the job. Here the small rock was transferred from cars to trucks by a crane with a clamshell bucket. The larger rock was unloaded by hand.

A fleet of 15 to 18 trucks hauled to the banks. In order to get the trucks down the slope so the material could be dumped in place, the contractor attached cables from Caterpillar D7 and D8 tractors to the front of the rock trucks. The trucks then backed over the bank and down the slope. When the load had been dumped, the tractor pulled the truck back to the top of the bank. Stones were arranged by hand labor to secure a uniform surface.

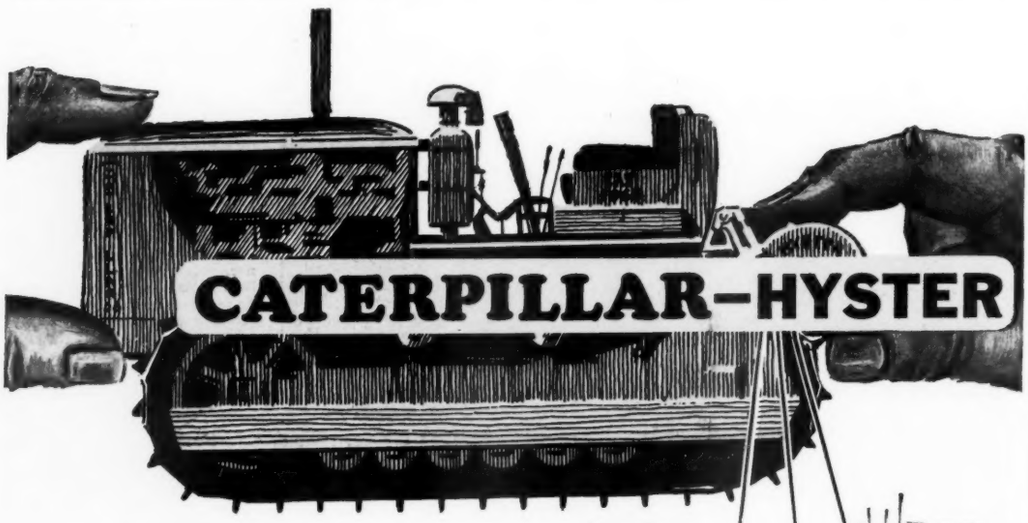
Rock used to weight down the board mattresses was delivered to the job in the same manner as the riprap. A roadway was graded down the bank to the water level where the stone barge was moored. Trucks backed down the bank and out on the barge, where they dumped their loads. The towboat then brought the barge to the location where the rock was needed, and a crew of workmen unloaded the rock by hand.

When the work was completed, the river bottom was protected against scour by the board mattress; the present bank was protected against wash by the riprap, and normal stream flows were directed away from the bank and toward the normal channel by the pile dikes. Damage from future floods should be minor in this locality.

Turner started on the $275,000 contract in April, 1954, and completed the work late in the summer. Mr. Turner supervised the project personally. Area engineer for the Vicksburg District of the Corps of Engineers was G. A. Langhofer, who supervised the work. Assisting him was E. C. Richie. Col. Thomas B. Simpson is district engineer of the Vicksburg District. **THE END**

Flexible Steel Appoints

Newt Crum is the new representative for Flexible Steel Lacing Co., Chicago, Ill., in California, Arizona, and Reno, Nevada. Flexible Steel manufacturers belt fasteners for joining conveyor and transmission belts.



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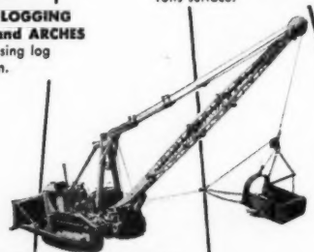

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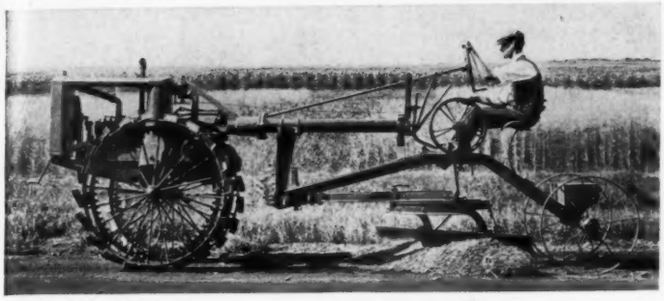

Behind the motor grader: years of development

At left is one of the first self-propelled motor graders, the 1920 Russell Motor Hi-Way Patrol, having steel wheels and front-wheel-drive. Above, Caterpillar No. 112's, a product of many engineering developments, finish a country road in Arkansas.

Contractors' familiarity with the motor grader has tended to lessen recognition of the fact that this machine is one of the most important pieces of equipment being used in today's construction industry. But this machine, which not only builds, levels, and maintains roads, and also cuts, casts, and mixes road materials, is still in a process of development which began long before the automotive age overtook the nation.

The moldboard probably came into being about 75 years ago. Since the time it was used under a farm wagon or two-wheeled cart, this part of the equipment has changed in size, shape, and composition.

The most important change in the motor grader has been in the machine used to position the blade. The first big step forward was made when the lightweight horse-drawn vehicles were replaced by large-wheel tractors hitched to the grader tongue. This allowed the grader to work in a ditch while the tractor remained on the road.

Self Propelled Units

The first self-propelled motor graders, developed around 1920, were still limited to maintenance work. The new graders had blade and power unit incorporated into one machine, which consisted of a grader frame built around a wheel tractor or crawler.

Gradually, motor graders grew in weight and power until, in 1931, Caterpillar Tractor Co. introduced a revolutionary version of the machine. Built as a complete unit, the Caterpillar grader had an engine mounted over the rear axle, power controls which operated blade and scarifier, and a rigid rear axle. These features gave the grader so many advantages that they were adopted by all manufacturers. A simultaneous development—the use of pneumatic tires on motor graders—equipped the machines to give an even better performance. The fuel economy and improved performance made possible by diesel engines eventually resulted in all but the smallest graders being diesel-equipped.

The first use of low-pressure tires in 1936 permitted the development of a newer, heavier, and more versatile machine. Further design advances and the widespread use of graders on construction jobs during World War II brought about a wide acceptance of the machine for many types of work.

Though the motor grader has had a large effect on construction in the past few decades, its biggest assist to contractors is undoubtedly still to come. THE END

The World Over . . .

WILLIAMS HOLE DIGGERS are on the job..

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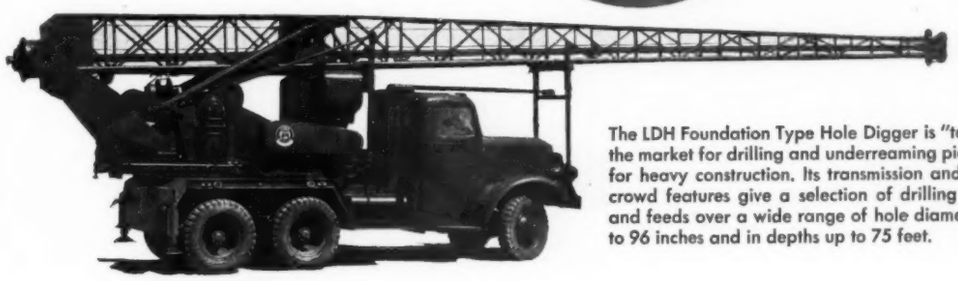
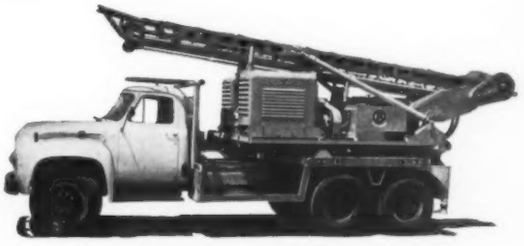


The LDH Foundation Type Hole Digger is "tops" on the market for drilling and underreaming pier holes for heavy construction. Its transmission and power crowd features give a selection of drilling speeds and feeds over a wide range of hole diameters up to 96 inches and in depths up to 75 feet.

The Williams LDHU Digger is a big, fast and rugged machine for electric power transmission line construction. Powered by a 500 cubic inch class engine or two 254 cubic inch engines with torque converters. The LDHU has six forward auger speeds and two reverse. It is specifically designed for drilling 12 thru 96-inch diameter holes up to 20 feet in depth.



The ADH Model of Williams Hole Digger is designed for rapid drilling of electric line pole holes, light foundation piers, soil exploration and other jobs that require holes from 8 inches through 36 inches in diameter. It is furnished in stock models for 10', 12', 20', 25' and 30' of drilling depth.

ALL MODELS OF WILLIAMS DIGGERS MAY BE EQUIPPED WITH WIGGLETAIL OR TURNTABLE PLATFORMS FOR RAPID SPOTTING OVER AN EXACT DRILLING SITE.

HUGH B. WILLIAMS MANUFACTURING CO.
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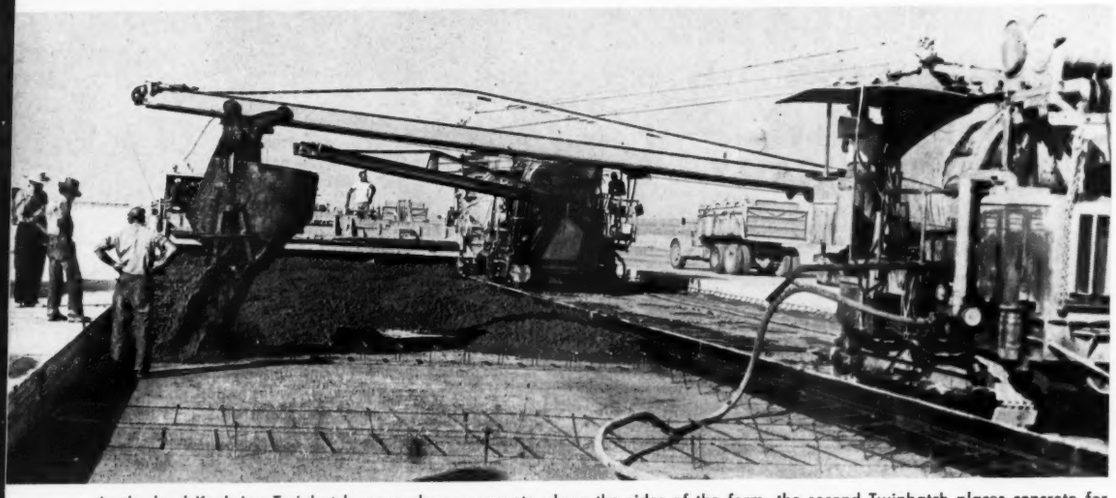
Heavy paving job enlarges big air force test center

Fast concrete batching by this modified Noble automatic plant enables the contractors to keep a loaded batch truck ahead of each paver.

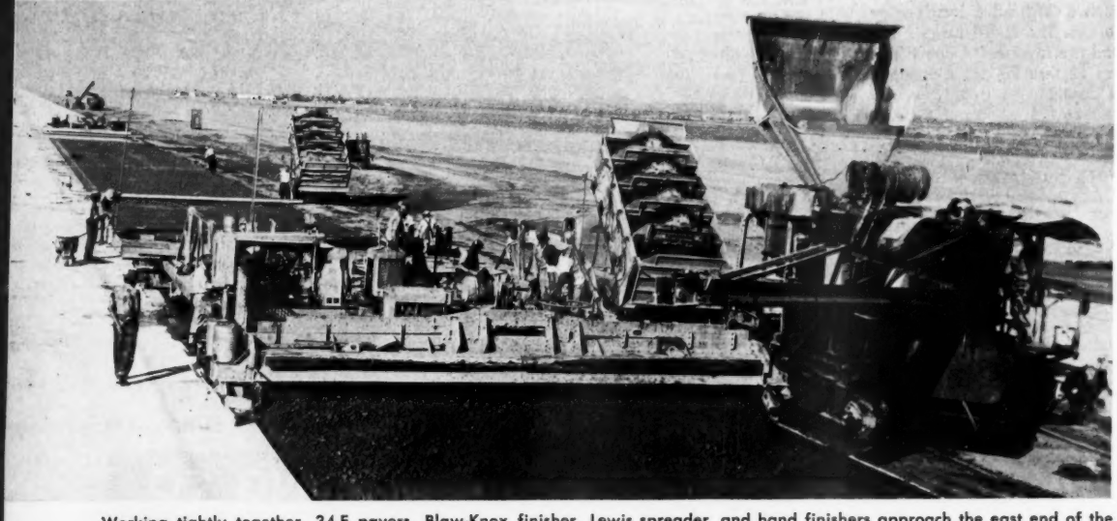
Heavy Heltzel forms are anchored to the subgrade by steel form pins, sunk by an Ingersoll-Rand pneumatic driving gun powered by an I-R 105-cfm compressor.

Total of 412,000 yards of concrete, up to 19 inches thick, goes into 15,000-foot runway, taxiways, parking apron

by RAY DAY



As the lead Koehring Twinbatch paver dumps concrete along the sides of the form, the second Twinbatch places concrete for the center and upper section of the slab. Just behind, a Blaw-Knox spreader levels and consolidates the material.



Working tightly together, 34-E pavers, Blaw-Knox finisher, Lewis spreader, and hand finishers approach the east end of the 15,000-foot runway. Each truck hauling to the lineup carries five batches of material.

JOINT-VENTURE contractors for the 15,000-foot-long portland-cement concrete runway for Edwards Air Force Base near Muroc, Calif., organizing men and equipment for high production, have brought the job in ahead of schedule despite inclement weather and the tough work involved in the heavy paving. Besides the 300-foot-wide runway, this 412,000-cubic-yard concrete job included connecting taxiways and a 6,000 × 300-foot concrete parking apron. Earthwork, drainage, electrical conduit, and regulation airfield marking installations completed the contract.

U. S. Army Corps of Engineers gave the general contract to the Los Angeles joint-venture firms of R. A. Westbrook and Morrison-Knudsen Co., Inc., and Ford J. Twaits. Even before these firms completed the job, however, Edwards already ranked as the third largest permanent air station in the nation. This runway and parking apron job is only part of the expansion program at the big air force test center. Edwards handles not only regular flights, but also flight characteristics tests on experimental aircraft.

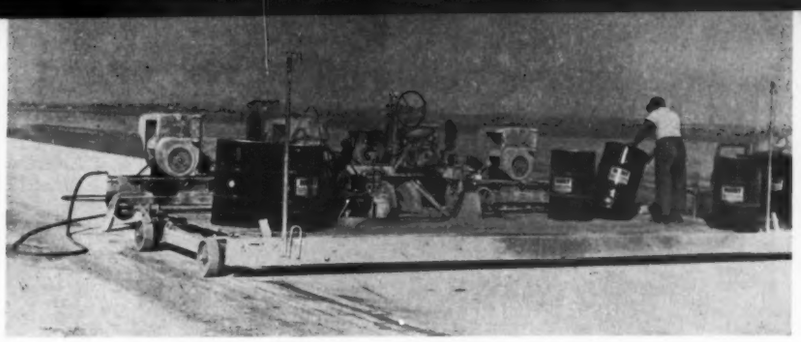
Heavy Design Used

The paving design for runway and parking apron is one of the heaviest used in the country. The pavement is on granular native subgrade material. Specifications required a compaction of 90 per cent density, and compaction extends 12 inches below the bottom of the 17 to 19-inch-thick pavement.

The concrete itself is a 3-inch-maximum aggregate mix, with a cement content designed to produce a flexural strength of 550 pounds in 14 days. For 1,000 feet at the ends of the runway, the pavement is 19 inches thick. This design will allow the runway to carry planes of the future which weigh up to 500,000 pounds.

One end of the runway stretches to the edge of Dry Lake, a vast hard-packed area which will provide an

additional 10-mile strip for emergency landings. The lake bed is being cleared of all obstructions so that a plane will be able to land with maximum safety under emergency conditions. Buildings or vertical drainage structures will not be built within one mile of the center line of the runway, and this will provide a cleared area 20 miles long and 2 miles wide to make the airfield approach one of the longest and safest in the country.



Drums of Hunt Process Clear are set in place on the specially-built concrete curing bridge which completes the paving spread. Hunt Process Co. subcontracted for curing, sawing, and joint pouring on the paving job.

Dirt Work Goes Fast

The earthmoving phase of the job called for 1,400,000 cubic yards of common excavation and the importation of 450,000 cubic yards of borrow material. The latter was used to build up runway and parking stand facilities to assure good drainage. Earthwork was subbed to H. Earl Parker, Inc., Marysville, Calif. Parker began moving in his 33-unit equipment spread in May, 1953.

Except for unusually long hauls—the average was 4,500 feet—earthmoving conditions were relatively easy. Parker used a fleet of 11 LeTourneau-Westinghouse Tournapulls, four of them electric Model D Roadsters. Four Caterpillar DW21's rounded out the hauling fleet. Five Cat D8's with companion Caterpillar scrapers did short-haul work and fine excavation. Auxiliary equipment included Caterpillar motor graders, 3,000 to 5,000-gallon water-tank trucks, three sets of Southwest 50-ton pneumatic compactors, and several sets of Southwest sheepsfoot tampers. The 120-ton experimental army rubber-tire roller, developed for airfield work in Alaska, completed the compaction spread.

Excavation was conventional; push Cats were used in the borrow pits, and dozers and motor graders leveled material on the fill. This material was watered in a flat lift, and as many as eight passes were required by the 50-ton compactor to achieve necessary density. By December, Parker had brought the job to the initial paving stage.

Heavy Concrete Forms

At the start of concrete work about 7,200 feet of Heltzel steel form sections, each weighing about 500 pounds, were brought onto the job. These were handled by a Hendy crane and a low-bed trailer pulled by a GMC truck. A two-man crew worked this equipment while an eight-man form crew staked, aligned, and set sections. All available forms—enough for a two-day paving run—were kept set up at all times.

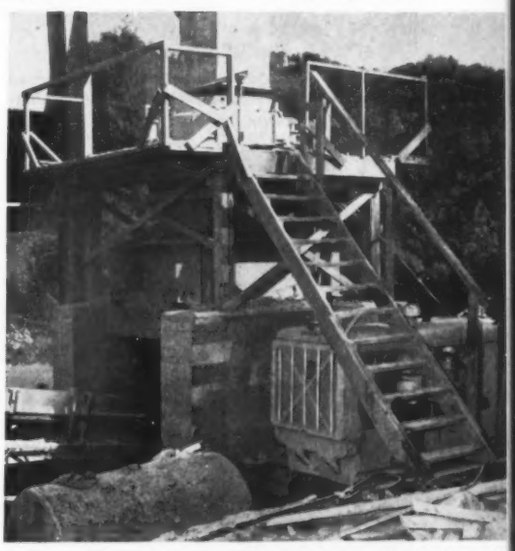
Heavy steel form pins were sunk through the subgrade by an Ingersoll-Rand pneumatic driving gun and an Ingersoll-Rand 105-cfm air compressor. Excess material was dumped into an adjoining lane by a Lewis subgrader and bladed so that it could be worked in with the grading spread. A three-wheel 10-ton Buffalo-Springfield steel-wheel roller followed to restore smoothness and density to the subgrade.

Practically all paving was done with two Koehring 34-E Twinbatch pavers, a Blaw-Knox spreader, and a Lewis and a Koehring longitudinal finisher. Hand finishers, a Hunt concrete-curing bridge, and a 16-blade

(*Continued on next page*)

On the West Virginia Turnpike

HOW CAT* ENGINES HELPED PRODUCE 3,000,000 TONS OF CRUSHED ROCK —IN A HURRY



Lambert Brothers crushing plant uses a D13000 to help produce 1,000,000 tons quick

Two Cat Electric Sets supply all the power for Central Materials crushing plant.

BECAUSE the 88-mile West Virginia Turnpike was to be paved in four months, 3,000,000 tons of rock required for base material had to be crushed and stockpiled starting in mid-winter. At the seven crushing plants, Caterpillar yellow was a predominant color.

Reported L. Freeman, plant foreman, Central Materials Corp., Canandaigua, N. Y.: *"These Caterpillar Diesels are the answer to the prayer and wishes of a rock-crushing company. They furnish all our electric power. We needed an absolutely dependable power supply and the Cat Engines gave it to us. They couldn't be better."*

Central Materials supplied 500,000 tons from two plants. A D386 and a D364 Electric Set powered a Cedarapids crusher designed to produce 250 tons an hour. A D8 with 'dozer worked at the quarry and a No. 12 Motor Grader leveled at the stockpile.

Reported Charles Ogle, superintendent of Lambert Brothers, Inc., Knoxville, Tenn.: *"Our Caterpillar Diesel Engines stand up under hard conditions. They require less attention than other diesels. The abrasive dust from the crushers does not get into their internal parts to cause expensive wear and down time."*

Lambert Brothers plant produced 1,000,000 tons. A Caterpillar D8800 Electric Set powered belts and screens. Two Telesmith 30 x 42 jaw crushers were each powered by a D13000 Engine. A D6 worked the quarry.

Here then are two good reasons to have modern, heavy-duty Cat Diesels on your side when a big job has to be done and done fast. One contractor liked their dependability, the other the way their seals and filters eliminated premature wear.

Next time you order new equipment, get the best—specify Caterpillar Engines. Leading manufacturers of crushers, excavators, compressors and other construction machinery can furnish Cat Engines as part of their equipment. And when it's time to repower, your Caterpillar Dealer can show you 12 sizes of engines and electric sets up to 500 HP and 315 KW.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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MODERN HEAVY-DUTY POWER

The six Viber electric vibrators mounted on the rear of the Blaw-Knox spreader consolidate the harsh and dry concrete. A Lewis finisher works just a few feet behind the spreader.

A Hendy crane, and low-bed trailer pulled by a GMC truck, handled the 500-pound Heltzel forms as they are stripped from a completed slab. A two-man crew handles the hauling and setting job.

(*Continued from preceding page*)

Cutcrete saw completed the spread. An auxiliary Foote 34-E paver handled some 80,000 cubic yards of paving. Mixing water was brought to the spread by a 4,500-gallon supply truck, transferred to a 5,000-gallon tow trailer attached to the lead paver, then fed to both pavers.

Paving Speed

Good production records were made, despite unfavorable weather, in putting down the runway. The contractor paved the 25-foot center lane first, then paved one lane on each side of the center strip. This process was continued until the outside lanes were reached. In 100 days of paving, 245,000 cubic yards of concrete were placed. On a peak day, with the Foote paver working as an auxiliary, crews laid 3,350 cubic yards. For 150 consecutive days, the two Koehring pavers averaged 2,400 cubic yards daily.

As the lead paver dumped its 1.39-cubic-yard batches along both sides of the form, batches for the center and upper portion of the slab were dumped by the 34-E paver which followed. The Blaw-Knox spreader, mounting 6 Viber electric vibrators, spread and consolidated the material. When the finishing crew had passed, Hunt Process Clear was applied from a curing bridge. Then 24 hours later, forms were pulled loose by the Hendy crane and moved to the next paving operation on the low-bed trailer.

Only two expansion joints were included in the entire job. These are located at the ends of the taxiway, and consist of conventional material covered with jet-fuel resistant compound. Throughout the rest of the pavement, joints were sawed on 25-foot centers. These joints, 3 inches deep and ⅛ inch wide, were cut by a Cutcrete saw 12 to 36 hours after concrete was placed, depending on weather conditions. Joints are filled with a special jet-fuel-resistant filler solution developed by Hunt Process Co., Los Angeles. All concrete sawing, curing, and joint pouring was done under a subcontract by Hunt Process Co.

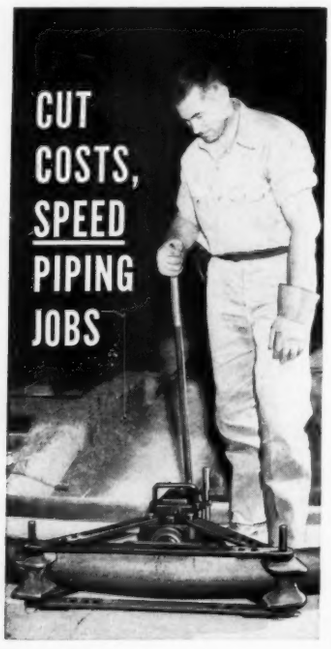
Equipment Upkeep

Paving first one side of the center strip, then the other side, permitted batch and material trucks to operate at maximum efficiency. It also put paving equipment through a rigorous test. Two new sets of liners were used in the Koehring pavers, and mixing paddles were hardsurfaced weekly.

As the job neared the one-third mark, one of the paver skips had to be replaced. A new closed-in skip, recently introduced by Koehring, was substituted. This was sufficiently heavy so that batch trucks could back into its bumper bar without damage to either paver or truck body. When it was found that the new skip cut time from the mixing cycle, the open-end skip on the other paver was modified to secure the same time advantage.

With this done, skip hoist and brakes on both machines lasted much longer before repairs were necessary. There was less shock strain on the skip cables. One set of Edwards 6×19 IWRC skip cable lasted through 15,600 batches, or 21,684 cubic yards of concrete. The GM Series 4-71 diesel engine which powered the pavers needed only routine maintenance throughout the 10-month project.

When paving started, not all of the runway area was in the clear. Only 7,500 feet of one of the 25-foot-wide



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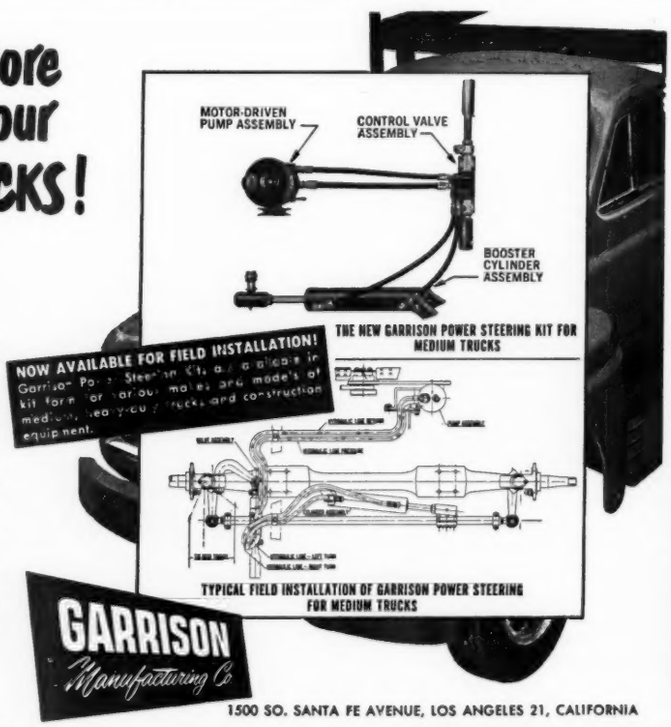
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runway strips was paved before operations were shifted to the parking apron and taxiways. Crews finished apron and taxiways first while buildings were removed from the runway site, then returned to finish the main job.

Some of the parking-apron slabs had a considerable amount of pitch, requiring forms on one side to be about 4½ inches higher than forms on the other side. The concrete had practially no slump, but though it was dumped 6 inches high in the upper side of the form, and six inches low on the other side, the material reversed itself after it was spread. Extra passes made across the surface with Lewis and Koehring longitudinal finishers wiped the material back to the top of the higher form.

Central Batch Plant

Concrete was supplied from a Noble automatic batch plant located a few hundred yards from one end of the runway and outside the restricted territory of the base. When first set up the plant required 40 seconds to put out a batch that would meet specifications. Field alterations increased plant capacity to 450 cubic yards per hour, well over the mixing capacity of the pavers.

An aggregate plant, later put on a commercial basis, was established by the contractors at Little Rock. Aggregates were trucked to the plant site in four sizes: 3 to 1½-inch; 1½ to ¾ inch, ¾ to ¼ inch, and sand. Since job requirements were high, many bulk cement manufacturers in southern California supplied the contractors.

A fleet of 15 batch trucks, each unit hauling five 1.39-cubic-yard batches, was rented from Miles & Son Trucking Service, Merced, Calif. This fleet hauled all dry-batched concrete on the job. About 4 per cent of entrained air was obtained with Airin.

Personnel

The job was under the general supervision of Col. Arthur H. Frye, Jr., district engineer for the U. S. Army Corps of Engineers at Los Angeles. William J. Leen was chief of operations, George P. Davis was project engineer, and W. W. Zimmerman was assistant project engineer in direct charge of the runway.

Contractors' forces were headed by project manager D. Gerald Bing, who was assisted by field engineer Frank Scully, office engineer Kenneth Ward, concrete superintendent W. R. Southworth, and headerboard foreman F. D. Moore. THE END

Cost-Saving Method Speeds Brick Work on Building

Final brick work on the $40 million 12-story addition to the 74th Street powerhouse of the New York City Transit System is going ahead on schedule, following the adoption of a swift and economical method of anchoring metal ties to spandrels and columns so that the brick front of the building can withstand the vibration of two 60,000-kw turbine generators.

Atlas-Carlin, a joint-venture firm of Atlas Tile & Marble Works and P. J. Carlin Construction Co., New York, N. Y., is doing this work on the 40,000-square-foot structure.

Though spot welding could have been used for this particular job, Atlas-Carlin knew that spot welding would remove the weather proofing on the steel beams of the building. Then, after the ties had been fastened, the spot weld would have to be waterproofed.

But alternative methods—such as using a bracket fastener spot welded to the back of the beam or drilling and tapping for each tie—would be even more expensive.

Finally, Ramset powder-actuated tools and fasteners were tested, and they proved to be best suited to the particular problem confronting the contractor. The powder-actuated equipment not only did the job more economically, but permitted brick ties to be fastened into the weather-proofed steel 85 per cent faster than could be done with the spot welding method.

Powerful Motors Will Drive Sheaves for Raising, Lowering Twin-Lift Spans on New Railroad Bridge

Powerful amplidyne-controlled direct-current motors will be installed on the New York Central Railroad's new twin-lift bridge spanning the Harlem River in New York City. The big motors will raise or lower the two 1,400-ton spans a distance of 135 feet in just 90 seconds.

The new bridge, which is scheduled for completion in 1956, is actually two identical spans side by side. Each 340-foot-long movable span carries two passenger-train tracks. Each span will have its own 219-foot lift towers at either end.

The General Electric mill-type motors which will lift and lower the spans via big sheaves at the top of the four towers will have amplidyne-type control to provide the precise operation required of the movable spans on the main-line bridge. Continuity of service, accurate speed control, and correct maintenance of span alignment as the big trusses move up and down are some of the features which the system will provide.

Electrical equipment furnished by G-E for the Harlem River bridge also includes normal and emergency span-drive motors, normal and emergency motor-generator sets for dc power for drive motors, motors and brakes for lock machinery, and complete control equipment for normal and emergency operation of the bridge.

The bridge will replace a swing-span structure built in the late 1880's.

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A jeep owned by a Caterpillar dealer in Bolivia goes through waist-high ruts on the old road to bring equipment parts to the work site. Before the new road was completed, traveling time for the 312-mile trip ranged from four days to a month.

Difficult Bolivian terrain yields to highway builders

One of the longest integral stretches of road built by a single contractor can be claimed by Macco Panpacific Co., Paramount, Calif., for its work on the 312-mile highway between Cochabamba and Santa Cruz, Bolivia. The roadway, still without a surface course, has a minimum vertical sight distance of 500 feet, and a minimum grade of 7 degrees compensated for curvature.

When settling is complete, asphaltic concrete will be placed along its entire length. To date, about 25 miles at either end of the road have been surfaced. The base course is crushed stone or gravel, averaging 6 inches thick. The upper 20 inches of all fills is select material spread in 6-inch layers and compacted to 90 per cent of maximum density.

This road cuts traveling time between the two important Bolivian cities to about 15 hours. Previously, the trip required from 4 days to a month, depending upon the weather.

Macco Panpacific, now Thompson-Cornwall, Inc., a veteran of numerous construction jobs in Central and South America, started work four years ago and immediately ran into more than one job's share of problems.

Shipping Equipment

The first was the task of shipping about $2,500,000 worth of heavy construction equipment to the site. Almost 900 pieces of equipment—including power shovels, Caterpillar tractors, welding machines, and concrete mixers—were required. This huge fleet forced the contractor to keep a running inventory of parts valued at more than $800,000.

Keeping these units repaired and fueled was another major consideration. Because of the high altitudes, engines lost as much as 20 per cent of their efficiency and so required more fuel. Altogether, about 120,000 gallons of gasoline and an equal amount of diesel oil had to be shipped to the site monthly. Diesel fuel was brought 4,500 miles by sea from California, and 800 miles by narrow-gage railroad from Antofagasta, Chile.

To complicate the problem, the railroad did not possess tank cars and Macco Panpacific had to have them built specially to haul the fuel. Once at Cochabamba, fuel had to be shuttled to storage areas by ten 3,700-gallon semi-tank trailers. Then it was transferred to working units by twenty 1,500-gallon tankers mounted on four-wheel-drive truck units.

Construction was hampered constantly by the terrain, the altitude, and swarms of ticks and gnats in the rain forest climatic belt. Even at 10,000-foot elevation, continual moisture made the ground swampy. Crews had to work in heavy fogs which settled as the humid air of the Amazon Basin met the colder air of the

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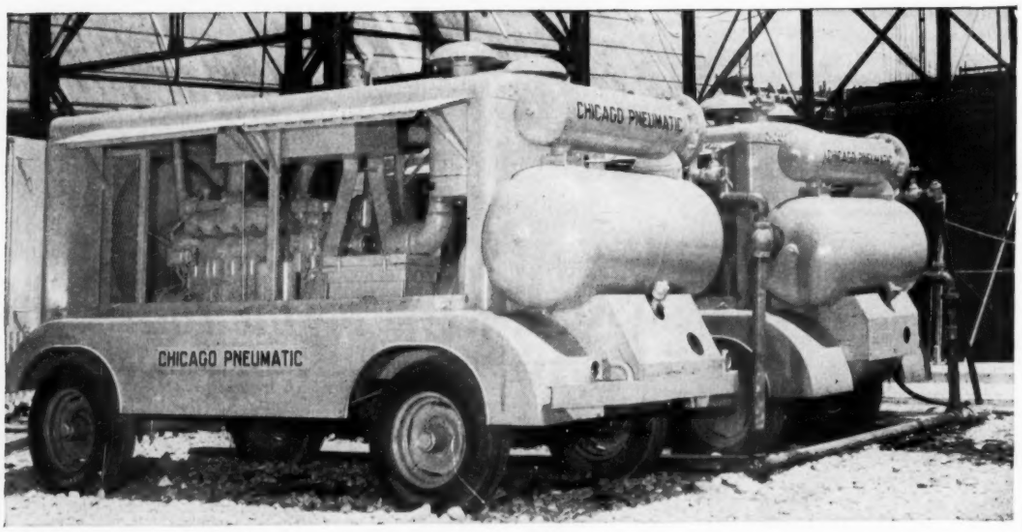

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A bench cut is made by Caterpillar D8 tractors and dozers on a section of the Cochabamba-Santa Cruz highway, which cuts through one of the wildest regions of Bolivia.

mountains. Slides plagued operations. Glacial till on an underlying blue clay made sodden by heavy rains, springs, and underground seepage became "crawling mountains."

To combat this, the contractor used bench cuts and extensive subdrainage. In one area crews took one year to complete 20 miles of road. In some cases, the contractor waited until a slide had come to rest, then dug out to a point where the ground reached the angle of repose. In one location, a half million cubic yards of rock had to be moved down a 450-foot face from the top of the roadbed. And in addition to working on the highway, the contractor had to build miles of access roads to approach difficult areas. Excavation for the job totaled about 14,500,000 cubic yards, and about 400,000 cubic yards was moved each month. Approximately 2,235,000 pounds of explosives was required—one pound for each cubic yard of rock.

Management Program

Constructing the road meant the contractor had to have not only a well organized work force, but also an efficient managerial setup. Project manager Max Winter, Jr., had headquarters at Comarapa, where maintenance and repair shops, warehouses, stockrooms, mess halls, and housing were concentrated. A farm and meat packing plant, with allied facilities, solved the problem of feeding the 2,500 men on the job. To cut time lost by transporting crew members from the job to their homes every weekend, the company worked out an accumulated off-time plan.

The new road, cutting through some of the wildest country in Bolivia, is expected to bring new economic life to a region which has always been isolated from the rest of the country. The possibility of building the highway was first studied in 1928 and in 1931 a road was eventually started. In 1933 this narrow and unpaved road was ready for use. But travelers had to allow a minimum of four days to get from Cochabamba to the country's second largest city, Santa Cruz. Sometimes, the trip took two weeks. In 1943, under an agreement with the U. S. Bureau of Public Roads, Bolivia undertook a survey for a new and best possible route between the cities. Charting this route took five years and cost $2,363,000. Although some work on the new road was started in 1943, it was not until 1950 that Knappen, Tippett, Abbett & McCarthy, New York, N. Y. engineering firm, assumed supervisory control of the job and Macco Panpacific started working.

THE END

All-Season Gear Lubricant For Construction Machines

■ A leaflet giving details on a gear lubricant that can be used both winter and summer is available from The Thomas Co., 1645 Hennepin Ave., Minneapolis 3, Minn. Recommended for construction machinery, the Thomas all-season lube falls within the viscosity range of SAE 80 to SAE 140 of standard gear lubricants.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

H. K. Porter Appointment

H. K. Porter Co., Inc., Pittsburgh, Pa., incorrectly identified as having its head office in Somerville, Mass., in the November issue, has appointed Robert C. Houser assistant treasurer.

Another ALL-LIPPMANN Pit

180 tons per hr. washing capacity

Here is a complete, mobile crushing, screening and washing plant that is a profit maker in any pit. It's Lippmann-engineered from bank to stockpiles to produce both washed and unwashed grades. It's portable so that it can be moved quickly over the highway to a new location. Designed with true balance and sturdy construction, these Lippmann portable units are so smooth running that when reaching destination they actually require little or no blocking before going into action, another profit making extra that is usual with Lippmann equipment.

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2 Lippmann radial stacker from hopper to primary crusher.

3 Lippmann Primary Crushing Plant with 24" x 36" "Grizzly King" jaw crusher and "Screen-All" vibrating screen.

4 Two Lippmann Portable Secondary Crushing units with Roll Crushers and "Screen-All" vibrating screens. One delivers to the unwashed stockpiles, the other to the washer.

5 Lippmann Portable Washing plant has large scrubber, triple deck "Screen-All" vibrating screen and efficient sand drag.

6 Seven Lippmann portable belt conveyors stockpile the different grades of sand and stone, and load trucks.

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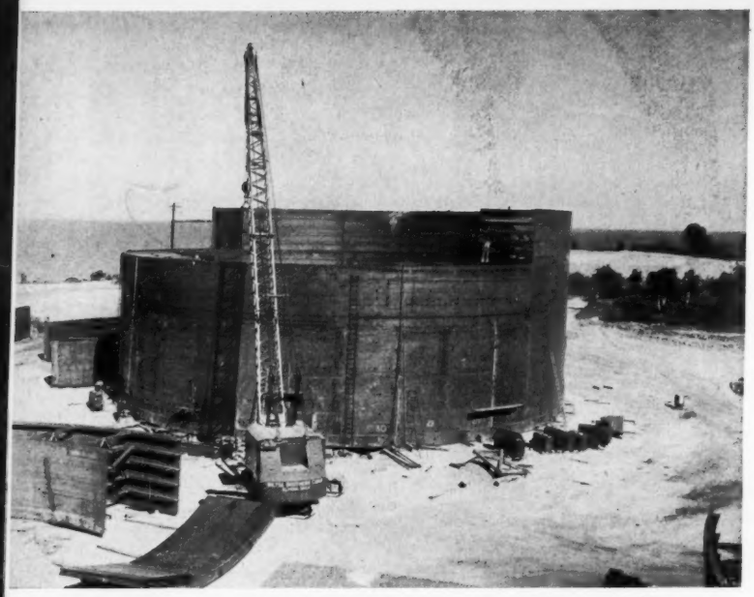
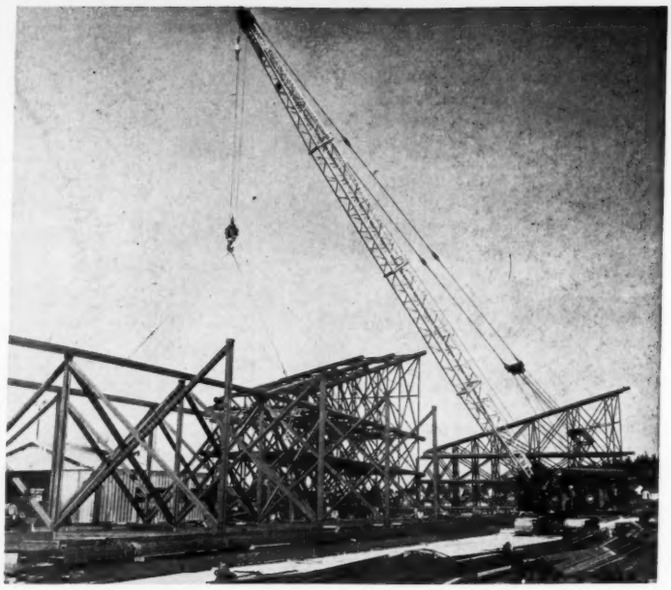
CRUSHERS FEEDERS SCREENS CONVEYORS CRUSHING & WASHING PLANTS

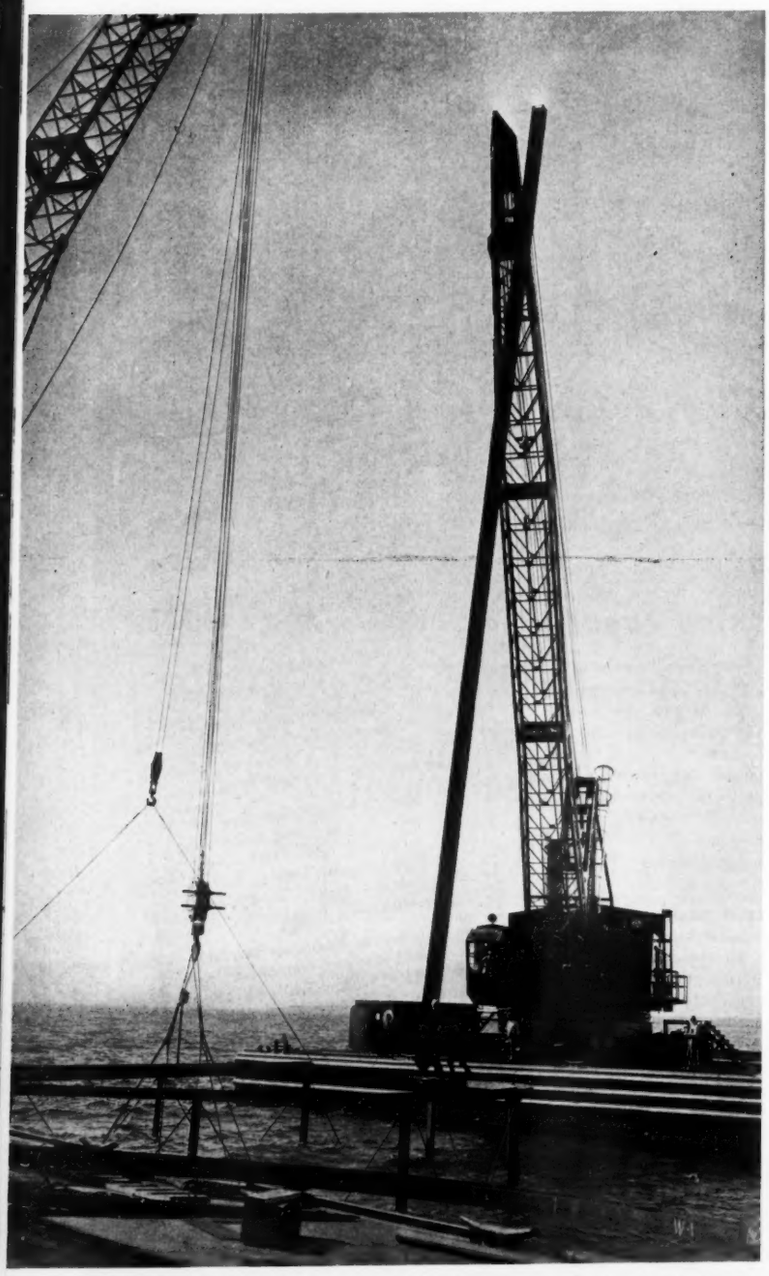


In the fabrication yard at Alpena, Mich., a Manitowoc 3900 crane holds a section in place as welders work inside the pier 20 caisson. The lower 24 feet of the caisson is the cutting edge; the upper 24 feet consists of two 12-foot rings.

C&E Staff Photos

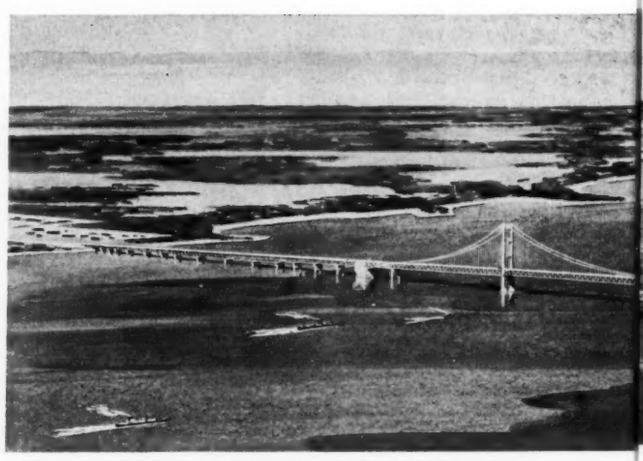


A Lima 803 crawler crane with 110 feet of boom sets 8-inch 31-pound WF sections for the pier 22 cofferdam frame. When completed, the cofferdam will measure 115 × 135 feet in section.



As the Creole holds the frame suspended in the water, the floating derrick Apache, an R-20 American Revolver, places the first spud for the pier 11 frame. Another ring was later added to give the frame a height of 70 feet.

Substructure work star



Big equipment fleet begins work on first piers for five-mile span across the Straits of Mackinac

A dream of 70 years, the construction of a suspension bridge across the 5-mile Straits of Mackinac, took a long step toward becoming an $80 million reality as the 1954 construction season ended with three piers for the span standing 10 feet above water.

Currently, fabrication which can be done on shore is going forward, and concrete placement will continue until cold weather forces work to halt. When ice clears from the Straits this spring, one of the largest assemblies of floating equipment will move back onto the job to complete substructure work. Marine equipment on the project, valued at $4 million, includes six new floating derricks. And more equipment will be on the job this spring.

Substructures for the long suspension bridge and the connecting truss spans are being constructed by Merritt-Chapman & Scott Corp., New York, N. Y., under a $25,735,600 contract with the Mackinac Bridge Authority, an agency of the State of Michigan. The superstructure, to be built by American Bridge Division United States Steel Corp. at a cost of $44,500,000, is expected to be started this year, though the bulk of this work will be done in 1956 and 1957. Contracts for construction of approaches, paving, toll collection facilities, and other items will be let from time to time as work progresses.

Longest Suspension Bridge

Measuring 8,614 feet from out-to-out of its massive concrete anchorages, the suspension portion of the bridge will be the longest in the world. The main span of 3,800 feet is second only to the 4,200-foot span of the Golden Gate Bridge at San Francisco. Steel towers will rise 552 feet above

tar ng suspension bridge

by RALPH MONSON, field editor

the water level, and their concrete footings penetrate more than 200 feet below the surface of the water. From the tops of the towers, the cables will extend back 1,800 feet to cable rest piers and then another 472 feet to the huge blocks of concrete which anchor the cables and transmit the load to the underlying rock.

Sixteen deck trusses with spans from 160 to 560 feet will make up the 5,694-foot south approach, while the north approach will consist of 12 trusses having a combined length of 3,610 feet. Viaducts and fill will connect the bridge with existing streets in Mackinaw City on the south, and with an existing mole on the St. Ignace side. A paved roadway, partly in cut and partly on fill, will carry traffic to the toll plaza and then to junctions with highways leading north and west from St. Ignace.

Substructures for the 33 piers in the water include some of the deepest and most massive ever built. The largest are the cable anchorages with bases measuring 135 feet long by 115 feet wide. They extend to solid rock at depths of 83 and 98 feet and rise 120.75 feet above water level. Each anchorage contains approximately 85,000 cubic yards of concrete weighing about 170,000 tons. The deepest piers are the bases for the two towers, and these are carried down to rock at a depth of approximately 200 feet below lake level.

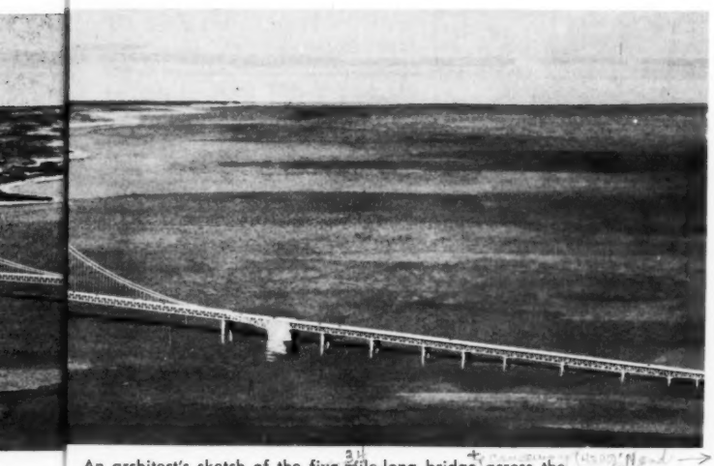
Between the two towers under the main suspension span, the rock bottom of the strait drops sharply to an unknown depth in a hidden rock gorge. Any shortening of the main span would have increased the depths of the tower foundations materially, and building footings in the depths of the gorge would have been extremely difficult and costly.

Of the 33 piers, 24 will be founded directly on bedrock, and the remaining 9 will be supported on heavy H-piles driven to solid rock. Caissons are being sunk for the three deepest piers—the two towers and the south cable bent pier. The other 30 piers are being constructed in cofferdams of various shapes and sizes. Numbering from pier 2 at the south, the south anchorage becomes pier 17. Pier 18 is the south cable rest pier, 19 and 20 are the tower bases, 21 is the north cable rest pier, and 22 is the north anchorage.

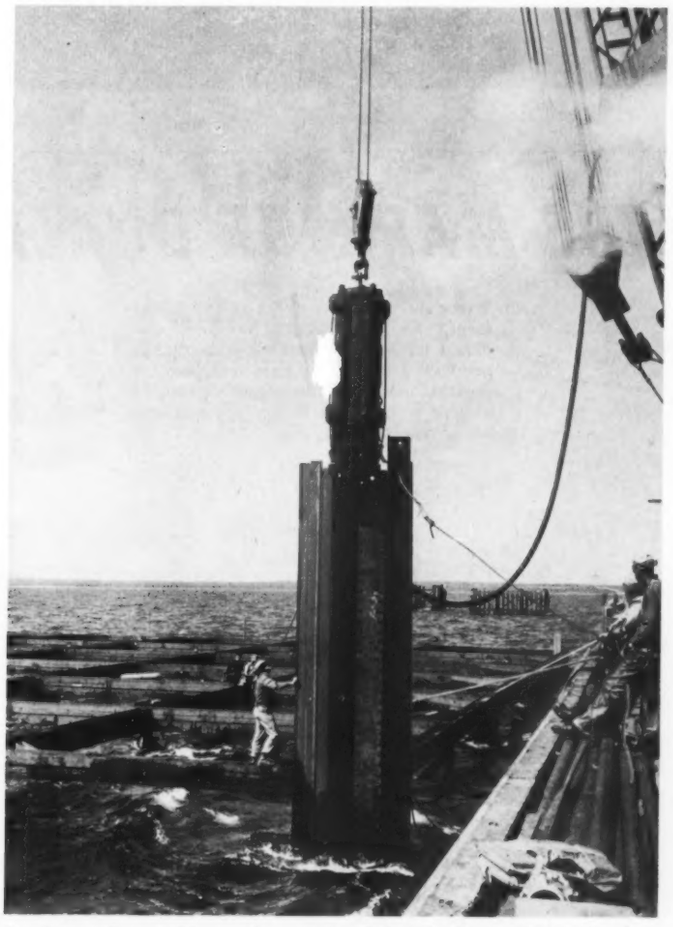
Sink Three Caissons

Included in the 1954 work program was the construction of piers 18, 19, and 20, in caissons, to elevation minus 8. The caisson for pier 18 is a rectangular box, 92 feet long and 44 feet wide, of steel plates and structural sections. It contains 21 dredge wells, 9 feet in diameter, arranged in three rows of seven each. This caisson was fabricated by American Bridge Division at Ambridge, Pa., and the lower 46-foot section was assembled in the Toledo yards of the American Ship Building Co.

Once assembled, the caisson was towed the long journey from Toledo on Lake Erie up the Detroit River,



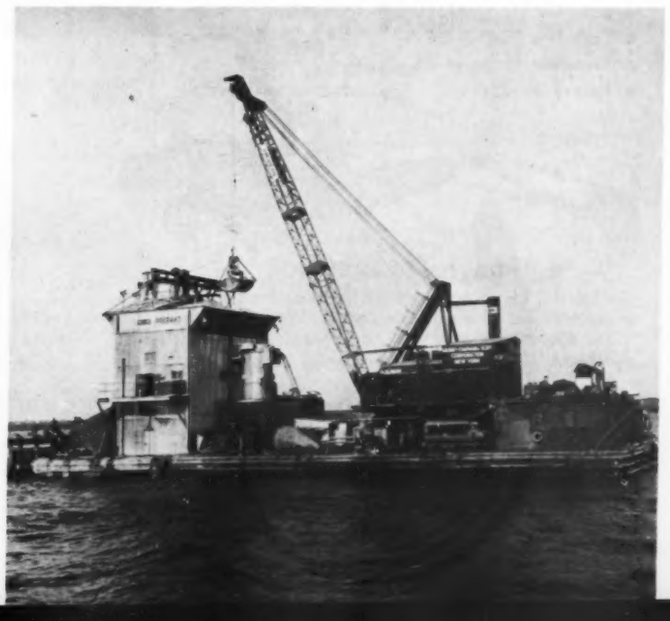
An architect's sketch of the five-mile-long bridge across the Straits of Mackinac, which will carry four lanes of traffic between Michigan's upper and lower peninsulas.

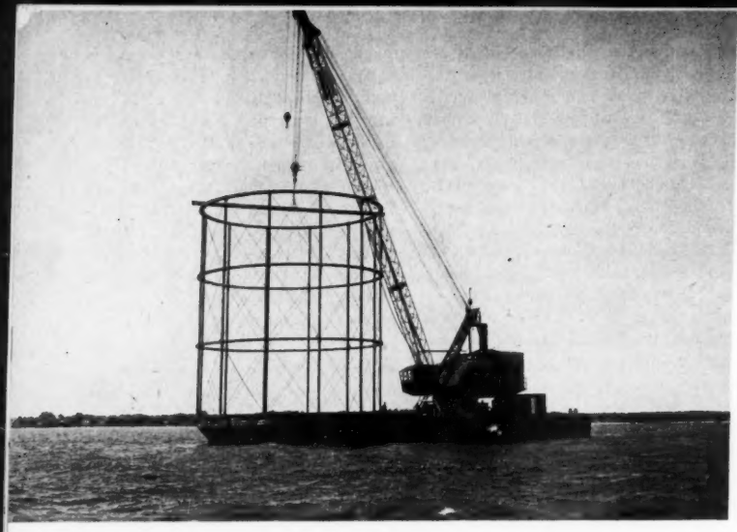


A McKiernan-Terry 10B3 steam hammer, handled by the floating derrick Cherokee, drives the first corner piles around pier 17 cofferdam. Sheathing consists of MZ-27 sections. In background: the tops of anchorages for the pier 18 caisson.

Coarse aggregate for the Prepakt concrete is placed directly in a pier cofferdam at a rate of about 2,000 tons per hour by a 12,000-ton capacity self-unloading boat. This material makes up more than 60 per cent of the concrete volume.

This floating Prepakt mixing and pumping plant consists of a Butler cement-Alfesil-Sand batching unit, two 8-yard Intrusion mortar mixers, and six Intrusion mortar pumps. An American Revolver charges the bins.





Rig Creole, a new R-15 American Revolver crane, is towed by a tug as it brings the circular cofferdam frame for pier 11 out into the Straits. The frame, 56 feet in diameter and 60 feet high, will have another 10-foot section added after it is set.

C&E Staff Photos

(Continued from preceding page)

then through Lake St. Clair, the St. Clair River, and Lake Huron to the Straits of Mackinac. This operation was undertaken by Roen Steamship Co., Inc., Sturgeon Bay, Wis., which used the 2,000-hp towboat John Roen IV for the job. However, the current of the St. Clair River proved more than a match for the ship's 2,000 horsepower, and a second boat was dispatched to assist the John Roen IV. With the 3,400 horsepower of the two tugs, the caisson was inched slowly up the river and out into Lake Huron, and six days after leaving Toledo the caisson arrived at the Straits.

To position the caisson accurately and to maintain the alignment as it was being sunk, Merritt-Chapman & Scott used a cluster or corral of special anchorage towers around each caisson. These consisted of a group of 9 or 12 steel pipes, 20 inches in diameter and long enough so that they protruded about 11 feet above the surface when they were set on bottom. Three of the pipes in each anchorage were battered for rigidity, and the others were vertical. Struts and braces of 6-inch pipe were welded between the big pipes to make each tower a rigid structure.

Anchorage towers were fabricated by Defoe Shipbuilding Co., Bay City, Mich., and placed on barges to be towed to the bridge site. Three of the big floating derricks lowered the towers into place. The nine-tube towers for pier 18 weighed 84 tons, and those with 12 pipes weighed 120 tons. When the anchorages were properly positioned, 12-inch 74-pound H-piles up to 146 feet long were driven through the 20-inch pipes to refusal. The space between pipes and piles was filled with sand to increase the rigidity, and a rigid welded connection was made at the top.

Anchorages were set on three sides before the caisson arrived at the site. After the caisson was towed into place, the fourth anchorage tower was used to close the open side. At the two circular piers, bracing truss was assembled around the tops of the four anchorage towers to tie them rigidly together. The caisson was sunk by placing aggregate and grout in the buoyancy chamber. As the top of the caisson neared the water level, the sinking process was stopped as an additional section was welded on top. This section measured 16 feet for pier 18 and 20 feet for piers 19 and 20. This process was repeated until the cutting edge rested on the bottom of the channel. Overburden was excavated from within the caisson with clamshell buckets as the sinking progressed. When the big shell settled to solid rock, all loose material was removed from the inside. The over-all height of the complete caisson for pier 18 was 138.5 feet. Those for 19 and 20 were 210 feet.

Large welding jobs, such as the addition of a section to the pier 18 caisson, were facilitated by the two welding barges M-C&S fitted out. Each consists of a steel scow, 120 × 32 feet, carrying two 500-watt Murphy diesel generator sets. Ten Hobart 300-amp welding generators are operated from the two big generators. The equipment on the deck of each scow is housed in a Butler steel building for protection against weather. By using both of the welding barges, 20 welders worked on a caisson at the same time.

Caissons Fabricated on Land

Caissons for piers 19 and 20, the tower piers, are big double-walled cylinders with an outside diameter of 116 feet. The inner shell, 86 feet in diameter, is completely open and unobstructed on the inside to provide a single big dredge well. The 15-foot space between the two shells is di-

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vided into eight watertight compartments by radial diaphragms. The cutting edges for these caissons are 22 feet high and taper from a width of 15 feet at the top to a thin edge the diameter of the outer shell at the bottom.

Subassemblies for these caissons were fabricated by the American Bridge Division at Ambridge, Pa., and shipped by rail to Alpena, Mich. Sections of the cutting edge, each 1/32 of the circumference, were fabricated by American Bridge at Gary, Ind., and shipped by barge to the assembly site at Rockport Harbor. Here, on the shore of Lake Huron a few miles from Alpena, the bottom 48 feet of the caissons were assembled by Wiltse Brothers Corp., of Alpena.

Wiltse first leveled an area slightly larger than the diameter of the caisson. On this, a ring of crushed rock was laid and compacted. Short pieces of steel rail were then placed around the ring for the cutting edge to rest on, and these too were carefully leveled. Sections of the cutting edge were set up on the rails by a Manitowoc 3900 and a Northwest crane. An assembly crew welded the pieces together just enough to hold them in place and continued setting additional sections until the entire ring was complete. Welding crews followed to complete the welds, tying the sections into a watertight doughnut-like cylinder.

In the meantime, other crews had been assembling caisson walls in sections 12 feet high and one-eighth of the caisson's circumference. These sections were picked up by the crane and placed on top of the cutting edge ring. Again, assembly crews tacked the sections in place and welding crews completed the joints. Two of these 12-foot rings were added, and segments of the third wall ring were assembled and made ready to be added at the bridge site.

At the same time, the floating derrick Ojibway, mounting an R-15 American Revolver crane, moved in and started dredging a deep channel from the lake to the caisson with its 2-yard Wellman clamshell bucket. When the channel was dredged to the caisson, the crane clammed out the material within and around the shell until the caisson was afloat and drawing 13 feet 11 inches of water. Four towing lugs were welded on at the top of the cutting edge ring, and the caisson was towed to its position at the bridge site.

The same types of anchorages were used to position and hold the cylindrical caissons for piers 19 and 20. The caisson for pier 20, the north tower, landed on the lake bottom at about 93 feet below the surface. Dredging operations started here and carried the big cylinder down another 105 feet to solid rock 200 feet under water. To allow for 9 feet of freeboard above water, this caisson was made 214 feet high. It required 2,739 tons of steel. Sinking the caisson to rock required the excavation of 45,000 cubic yards of material, which was piled up around the outside of the caisson. The pier 19 caisson for the south tower is the same height, but since the water was much deeper, less excavation was required.

Variety of Cofferdams

Piers built in cofferdams during the 1954 season include numbers 17 and 22, the two big cable anchorages, and pier 21, the north cable bent pier. Of these, 17 and 22 are big rectangular sections, and 21 consists of twin cylindrical piers each 50 feet in diameter. Pier 11, one of the ten piers on piles, is a single cylinder 56 feet in diameter.

The contractor improved and expanded an old coal dock in St. Ignace harbor to serve as a base for the floating equipment and as an area for fabricating and assembling the coffer-

(Continued on next page)

The American Revolver crane holds the pier 11 frame almost level with the deck of the barge as welders attach guides for the spuds.

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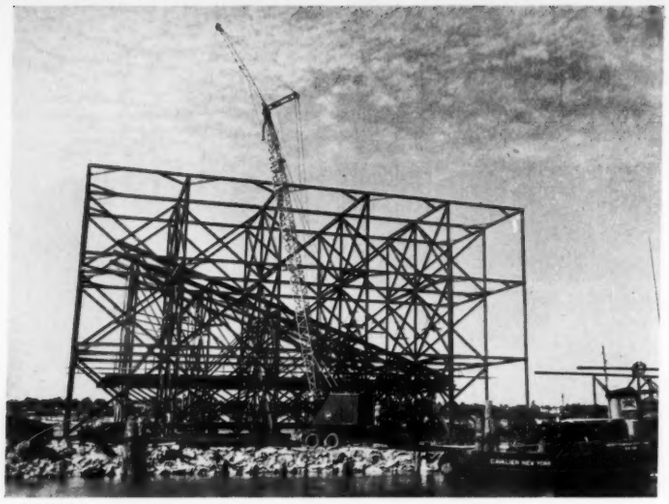

Final brace members for the 96-ton section of the cofferdam frame for pier 22 are set by a Bay City Model 180 motor crane with 75-foot boom and 30-foot jib. Sections of the steel frame will be bolted under water by divers.
C&E Staff Photo

(Continued from preceding page)

dam frames. Since frames for piers 17 and 22 were much too large to be handled as single units, they were fabricated on the dock in three sections. For the pier 17 cofferdam, each section was 115 feet long, 44 feet wide, 75 feet high, and weighed approximately 107 tons. These sections were assembled to a height of about 60 feet on the dock; the remainder of each section was welded to the lower part after the latter had lowered into the water.

Wales, shores, posts, and diagonals of the frames were made of 8 and 10-inch WF-beam sections, with all connections welded. Knee braces at all outside connections consisted of 6-inch 15.5-pound beams. When one of the sections was assembled on the dock, it resembled the steel framework of a fair-sized four-story building. These 96-ton sections were picked up by two American Revolver floating derricks and loaded onto a barge to be towed out to their location.

In each corner of each section of the frame, 14-inch 117-pound H-pile spuds were driven to refusal in the rock 88 feet below the surface. These spuds served as rails to hold the sections in alignment as they were lowered into the water. When the sections were in place, divers went down and bolted them together with 270 high-tensile stud bolts $\frac{7}{8}$-inch in diameter and 23 inches long. Then the floating derrick Cherokee, a 75-ton Wiley Whirley, anchored beside the frame and began placing the MZ-27 sheet piling sections which make up the outer skin of the cofferdam. The 99-foot sheathing sections, driven to rock 88 feet below the surface by a McKiernan-Terry 10B3 steam hammer, extended 11 feet above the water for freeboard.

Pier 11 lies near the middle of a secondary rock gorge which dips 174 feet below the water. Nine piers in this area will be supported on groups of 14-inch 117-pound H-piles driven to refusal in the rock through the thick overburden. The pier 11 cofferdam frame rests on the bottom in about 65 feet of water, and its top ring projects a few feet above the surface. Interlocking SP6A steel sheet piling 93 feet long makes up the shell of this cofferdam.

Wales for the cylindrical frame are 14-inch 34-pound beams, bent to a 56-foot circle. The four lower wales are spaced 20 feet apart, and the top two are 10 feet apart. Twelve rows of 6-inch WF posts provide the vertical members. Each panel between two

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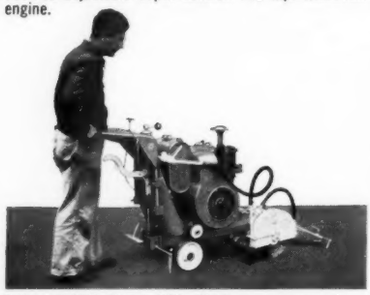

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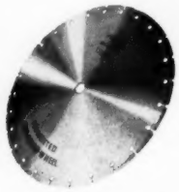

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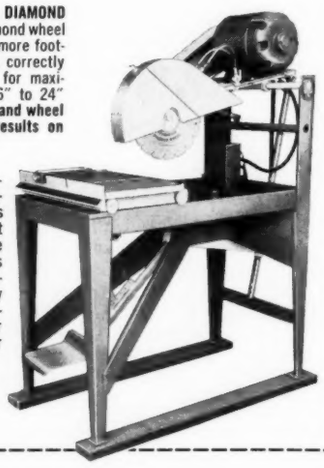

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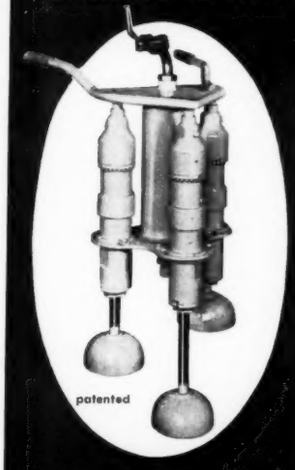

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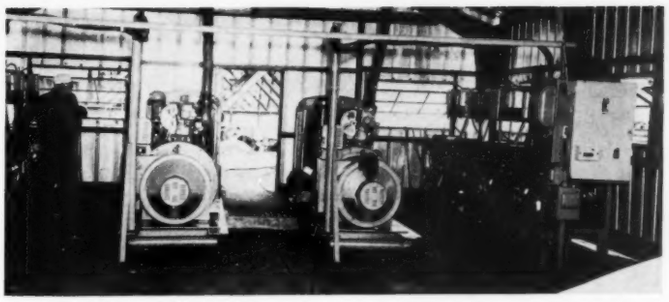
posts and wales is cross-braced with two 1-inch tie rods. After the frame was assembled to a height of 60 feet on the dock, the floating derrick Creole picked up the section, set it on the afterdeck, and carried it to position. The Creole lowered the 24-ton section into the water, where the additional 10 feet of height was added. While the Creole held the frame in place, another American Revolver floating derrick, the Apache, anchored alongside and set the four spuds to hold the frame in position.

Inside the cofferdam, the bottom was excavated about 11 feet, after which 110 H-piles were driven in three concentric circles to refusal in the rock below. All of these piles batter outward to aid in providing stability. A McKiernan-Terry S8 hammer, rigged for underwater driving, drove the 115 to 120-foot piles down until only their tops projected above the lake bottom within the caisson.

Concrete Work

All concrete for the bridge piers, both above and below water, is being placed by the Prepakt method. Drummond Island crushed dolomite and Rogers City aggregate, graded from 6 inches to ¾ inch, is deposited directly in the piers by self-unloading lake steamers carrying 12,000 tons per load. When a shipload of coarse aggregate has been placed inside one of the cofferdams or caissons, Intrusion mortar, a cement-Alfesil-sand grout, is pumped in through the grout pipes spaced at 10 to 20-foot centers until the voids are filled. Grouting starts from the bottom, and the grout pipes are raised as the pumping continues.

It is believed that several all-time records for underwater concrete placement were established during construction of the north suspension cable anchorage pier. During a 7-day period, 24,220 cubic yards of stone were placed and consolidated, with only one mixing plant in use. The average production over this period, October 21 through 27, was 3,460 cubic yards per day. A record 24-hour production of 5,040 cubic yards was reached on October 25.



Two completely equipped welding barges permit 20 welders to work on a caisson at a time. Housed in a Butler building aboard this barge is a battery of ten Hobart 300-amp welders, powered by two 500-kw Murphy diesel generator sets.

A total of 53,705 cubic yards of Prepakt concrete was placed in this pier in 16 working days for an average production of 3,357 cubic yards per day or 140 cubic yards per hour. By November 15, more than 130,000 cubic yards was placed on the project.

Cofferdam frames are incorporated into the concrete of the piers. The outside sheathing also remains in place after the piers are cast. Only the caisson anchorages and their spuds are recovered. Since the cofferdams are not dewatered until the concrete is placed to an elevation 11 feet below the lake level, they are not designed to resist the inward thrust of the water, but the outward thrust of the aggregates and the fluid mortar. The caissons are also filled with concrete in all compartments so that the steel shells become a part of the finished pier. Excavation from within the caissons and cofferdams is deposited around the outside of the structures to help hold them in place and retain the concrete.

Mixing and placing the grout is being done from the floating concrete plant Algonquin. This big barge contains an American Revolver R-15

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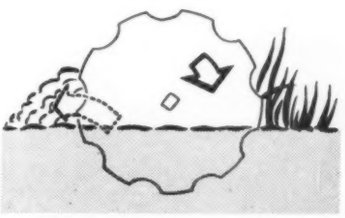

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Checking operations from the deck of the Cherokee are, left to right, project manager G. C. Denny, project engineer C. E. Haltenhoff, and assistant superintendent Jack Y. Denny, son of the project manager.

(*Continued from preceding page*)

crane, a Butler cement-Alfesil-sand batching plant, two 3-yard horizontal Intrusion mortar mixers, and six Intrusion mortar pumps. Sand is delivered in barges and transferred to a bin over the batching plant by the crane. Cement and Alfesil are towed to the Algonquin in four special steel barges measuring 128 × 32 feet, and having a covered cement house measuring 100 × 24 × 8 feet. Cement is transferred to the batching plant by Fuller-Kinyon pump and the Alfesil by a Fuller Airveyor.

Cement and Alfesil are loaded onto the barges at a dock specially constructed for the purpose at Mackinaw City. Petoskey cement is received at the dock in bulk truck-trailers directly from the mill. Alfesil arrives by rail in bulk cars. Link-Belt screw conveyors carry the materials from the car or truck hoppers to a bucket conveyor which elevates them to a head house. Chutes carry the materials from the head house to the barges.

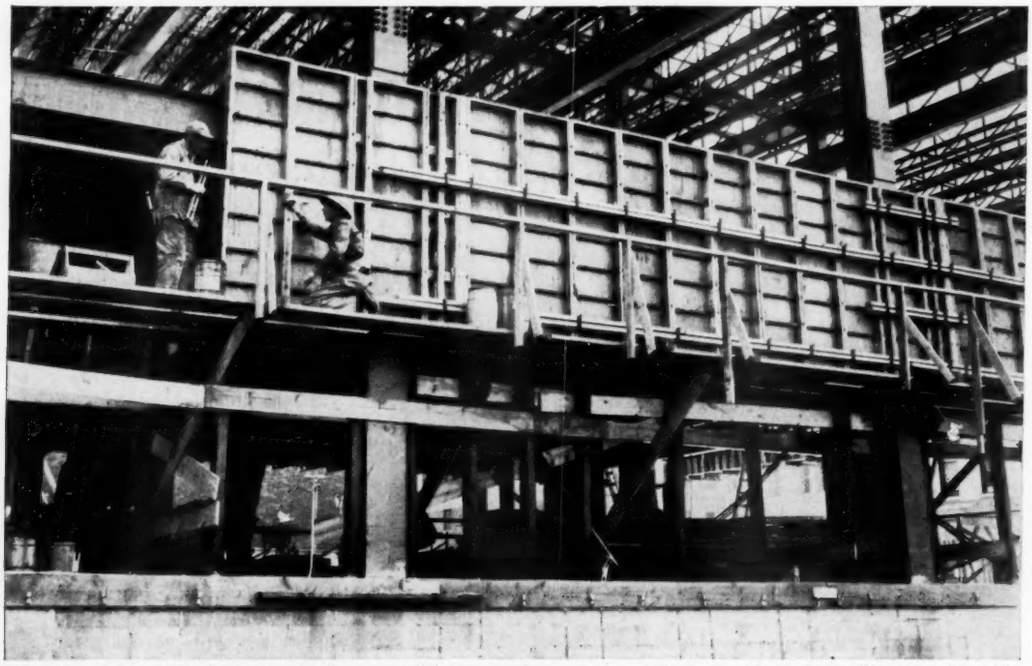
Intrusion mortar contains portland cement and Alfesil, a special grade of fly ash, in the proportion of 2 to 1, with an admixture called Intrusion Aid which provides both fluidity at a low water-cementing materials ratio and suspension for the solid materials. Sand which is high in fines is added in the proportion required to obtain the desired mortar strength. When a lift of approximately 10 feet of aggregate has been placed, the grout is pumped in through the 1½-inch grout pipes. The depth of the mortar is observed through a series of slotted pipes known as sounding wells, and the mortar level is kept uniform by the adjustment of valves on the grout lines. When mortar nears the top of the aggregate which has been placed, the mortar is brought to a uniform level and pumping is stopped. Grout pipes are then raised to a point just below the level of the grout, and another lift of concrete is placed. This operation is the same whether the grout is being placed below or above the water surface.

Concrete was placed to an elevation of 11 feet below the surface without dewatering the cofferdams or caissons. The top 11 feet was then dewatered and reinforced concrete from this elevation up was placed in the dry. During the 1954 season, concrete was carried up to 10 feet above the water in the two large cable anchorage piers and in one of the end-of-suspension-span piers. Prepakt concrete is now being placed in the other end-span pier and in the shell of the large circular caisson to provide weight for sinking it through the unconsolidated channel bottom. The caisson for the other main tower is touching bottom. It is expected that both tower caissons will be founded on rock and filled with an amount of concrete sufficient to provide stability before winter shuts down the field work.

The balance of the piers will be included in next year's program. Cofferdam sheathing was cut off at the minus 8 elevation and wrought-iron armor plate will protect the piers from that elevation up to plus 10.

Locating Piers

Setting one of the big cofferdam frames in exactly the right spot out in the wide and often turbulent Straits was no simple task. Exact locations for each pier were spotted from survey towers by triangulation. Towers at each end on the centerline enabled the survey parties to spot the piers on line. Other towers are located out in the water to the sides of the

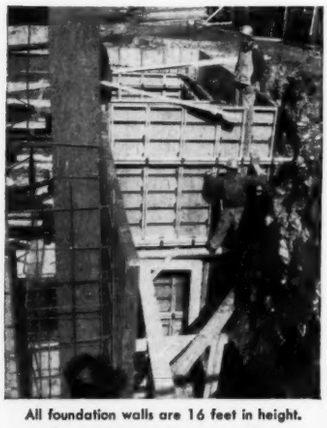


Symons Forms being used for forming Spandrel Beams up to 8½ feet on the Minnesota Mutual Life Insurance building. 9,000 square feet of Symons Forms were reused 12 times on this job. Symons Shores are also visible below. William Baumeister Construction Co., St. Paul, general contractor.

Contractor Cuts Two-Thirds off Forming Costs of Spandrel Beams with Symons Forms

Because of the efficient combination of Symons forming, shoring and scaffolding methods, the contractor was able to cut his estimated cost by two-thirds on the $2,000,000 home office building of the Minnesota Mutual Life Insurance Company of St. Paul, Minnesota.

In addition to savings in labor cost, considerable time was saved in forming the Spandrel Beams of this 9-story building. Sidewalk superintendents looking out of windows of the many surrounding office buildings could see real progress day after day. Forms were walked in place as efficiently as though they were on a footing on the ground. The adaptability of Symons Shores with their safe "T" heads speeded the forming and scaffolding work. The combination of forms, shores and scaffolding was the result of recommendations made by the Symons fieldmen.



All foundation walls are 16 feet in height. Note the use of only three walers.

This is the second of the big, new life insurance structures in the Twin Cities using Symons Forms for the concrete construction. It is the first of its size in St. Paul using a structural steel skeleton with standard and clear span joists, with its decking of corrugated steel sheeting covered by concrete. 2 x 8 ft. Symons Steel Rib Forms were used to frame 56,000 square feet of spandrel beams. Symons Shores were used throughout in beam construction. All foundation walls are 16 feet in height.

Symons Engineering and Customer Service also played an important role in this project. The Symons Engineering Staff furnished complete form layouts and job cost sheets on the form work—at no charge to the contractor. This service enabled the contractor to get a clear picture of his job (its cost, bill of materials and labor saving methods). Symons fieldmen gave regular on-the-job service. First, by on-the-job recommendations of forms and hardware needed. Second, by showing the workmen how to set up the forms efficiently. Third, by being available and giving service on last minute requirements.

View of a spandrel beam after Symons Forms have been removed.

Symons Forms, Shores and Column Clamps can be rented with purchase option. All rental charges apply on the purchase price, during a 60-day period.

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bridge alignment for triangulating the exact positions along the centerline. These survey towers—seven on land and six in the water—were among the first structures installed by the contractor.

A typical tower in the water consists of three 18-inch pipes spaced in a triangle 16 feet apart at the top and 36 feet at the bottom. Cross braces of 4-inch pipe are welded between the big pipes to make a rigid tower. Steel H-piles, driven through the pipes and into the bottom, hold the towers securely in place. There are six towers in the water, three on each side of the alignment. The tallest of these rises 110 feet above the bottom of the channel.

In order to guide the floating derricks into position to drop their anchors, a spar buoy was set at the approximate location of the pier. The floating derrick then placed its four 7-ton anchors approximately 500 feet from each side of the buoy. The craft then maneuvered into exact position by the use of the deck engines which handle the anchor cables. Each survey party had a Hallicrafter portable short-wave radio set, and one was carried on the derrick which set the cofferdam. This enabled the survey parties to direct the derrick to the exact location.

Short-wave radio plays a very important part in the contractor's operations also. With 38 mobile units on tugs, derricks, personnel launches, cars, trucks, etc., the M-C&S Motorola system is in almost constant use. See page 34 in this issue.

Four Year Program

The project was started May 27, 1954. With less than four years to complete the job, the contractors must work at full speed while they can, since winter claims five months of each year. To do this, Merritt-Chapman & Scott is using one of the largest equipment fleets ever assembled for a construction project. Included are three new American Revolver R-20 floating derricks and three new American R-15 derricks. These are mounted on steel hulls measuring $50 \times 120 \times 10$ feet. Another new machine is the floating concrete plant Algonquin which mounts an American Revolver R-15 in addition to the concrete mixing facilities.

Older rigs in the fleet include the 75-ton Wiley Whirley floating derrick Cherokee, the 30-ton Number 5, and an A-frame Clyde derrick. Of 12 material scows, some are new and some have been moved from other jobs. Six tugboats are on hand to tow the equipment and scows. Personnel are transported on water by five personnel launches powered by GM diesel engines. Land-based equipment includes two Lima crawlers, one Lorain truck-crane, one Bay City truck-crane, and Ford trucks and pickups.

Personnel

To complete this huge project in the short time allotted, the contractor worked two 10-hour shifts seven days a week. At the maximum, the crew consisted of about 650 workmen. Project manager for Merritt-Chapman & Scott is G. C. Denny. Project engineer is C. E. Haltenhoff. B. F. Sanders is the assistant project manager pushing actual construction.

The structure was designed by D. B. Steinman, New York, N. Y., who is represented on the job by resident engineer J. W. Kinney. Herbert Goodkind is project engineer. Prentiss M. Brown is chairman of the Mackinac Bridge Authority. THE END

A list of coming conventions appears on page 38 of this issue.

Harnischfeger Expands Line

Patent and manufacturing rights of the Sierra Loader have been purchased from the C & D Mfg. Co., Sacramento, Calif., by the Harnischfeger Corp., Milwaukee, Wis., manufacturer of construction and industrial equipment.

Sales of the loader will be handled by the P&H Power Crane & Shovel Division through Harnischfeger's distributor organization. T. H. Rutherford, formerly with C & D Mfg. Co., has joined Harnischfeger to direct sales of the machine.

At the same time, the corporation announced that the P&H Small Excavator Division has now been designated the P&H Power Crane & Shovel Division. It will handle sales of all P&H crawler machines. The official designation for the division that is in charge of all electric machine sales is now the P&H Electric Shovel Division.

Lehigh Elects Mullen

The new executive vice president of the Lehigh Structural Steel Co., Allentown, Pa., is R. Leslie Mullen. He succeeds William H. Mohr, a cofounder of the firm, who recently resigned both as executive vice president and plant manager.

George J. Neumann, vice president and assistant plant manager, will now succeed to the post of plant manager.

Mr. Mullen, a vice president of Lehigh since 1905, is also a vice president of Lehigh Construction Co. and Utilities Service Co., both affiliates of Lehigh Structural Steel.

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•

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now—the logs are lighter with MUSCLES OF STEEL

Gone are the days when muscles of man and beast were the only means of loading and hauling big timber out of the woods. Supplying present-day lumber needs is a job that would lick ten thousand Samsons.

It's a job that demands *muscles of steel*—rugged wire rope that lifts and pulls the heaviest logs with strength to spare.

We of Wickwire play a big part in furnishing these *muscles of steel* to American industry. Wherever wire rope is used—timbering, drilling, construction, mining, fishing, materials handling—there also you'll find Wickwire Rope helping to do a better, more efficient job. That's the reason for the quality and extra care that go into its making.

every industry benefits from wire rope

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WICKWIRE ROPE • A CF&I PRODUCT

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WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Kankakee (Pa.) • New Orleans • New York • Philadelphia

Radio—The vital link on the Mackinac project

Two-way system coordinates construction operations of land-based and floating equipment on bridge job

Station KQE279, operating on a frequency of 43.02 megacycles with a power of 60 watts, carries no musical programs and no advertising. But, to its little group of listeners, it is the most important station on the air. This station, with its 38 two-way branches, is the radio network of Merritt-Chapman & Scott Corp. on the construction of a bridge across the Straits of Mackinac from St. Ignace to Mackinaw City, Mich.

By 1957, the big bridge will span five miles of water between the two cities with a series of trestle, truss, and suspension spans. But at present, only the invisible waves of a Motorola mobile radio system link the floating rigs of the M-C&S fleet in the channel with shore installations at a number of points on both sides.

Using the Motorola system, Grover C. Denny, project manager for Merritt-Chapman & Scott, talks to one of his superintendents.

With a fleet of floating equipment valued at $4 million, plus a considerable number of land-based units working at many widely scattered locations, the need for a convenient form of communication is great.

The radio setup on this job consists of 38 units. Ten are installed on floating derricks of the fleet. Six are on the job tugs. Six are in personnel boats. Seven are in trucks and automobiles. Seven are located in St. Ignace, Mackinaw City, and various other offices. Two are Handi-Talkies used by the engineering crews as they move from place to place. In addition, the portable radios used by D. B.

MIL-CARB* **Carburized WASHERS are an important part of the Picture, too!**

*TRADE-MARK

Steel framing, University of Illinois Research Hospital, Chicago, employing high tensile steel bolts and MIL-CARB Washers. Erectors: Allied Structural Steel Co., Chicago.

In the selection of the most desirable materials for this installation, the Allied Structural Steel Co., as erectors, specified high quality bolt assembly units, with the result that **Gary Screw and Bolt Division of Pittsburgh Screw and Bolt Corporation** supplied MIL-CARB Washers to be used with their High Tensile Strength bolts and nuts.

MIL-CARB Washers were a logical choice for this important bolted steel structure, as in many other major projects, because of the inherent characteristics of the steel and heat treatment employed in the fabrication of these washers. Prime Carburizing Quality Special Soundness Steel is used to insure uniform quality control — always equal to the rigid specifications for this form of steel assembly (ASTM Designation A325, applying to bolts, nuts and washers).

Both nuts and washers must meet a proof load equivalent to the ultimate load of the bolts and it is on this basis that MIL-CARB Carburized Washers are today winning dominant preference in the structural steel building field.

It is axiomatic that no bolt assembly is any better than its washers. And it is because MIL-CARB Washers overcome inherent weaknesses often present in heat-treated washers fabricated from steel of questionable quality that it pays to specify:

MIL-CARB Carburized Washers for uniformly sound construction.

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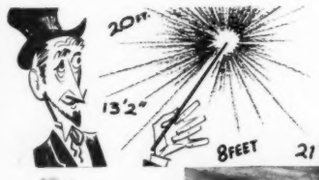

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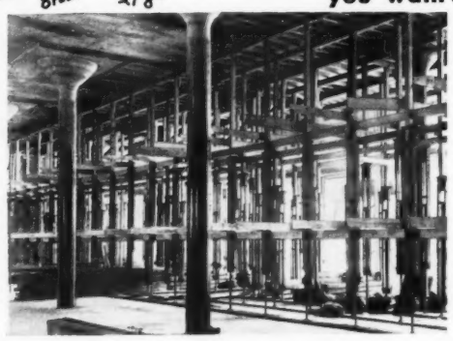

the *New* Rooshor —EXTENSION TYPE

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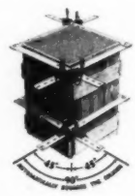
STANDARD ROOSHOR

Instantly adjustable to accurate height—without pins or screws to cause needless delays. Three sizes, giving adjustment from 8' to 14', 7' to 13' and 5' to 9'.



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Please rush additional information on Rooshors and Roos Column Clamps without any obligation.

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Steinman, the consulting engineer on the project, are temporarily operating on the same frequency.

Forms Link for Crews

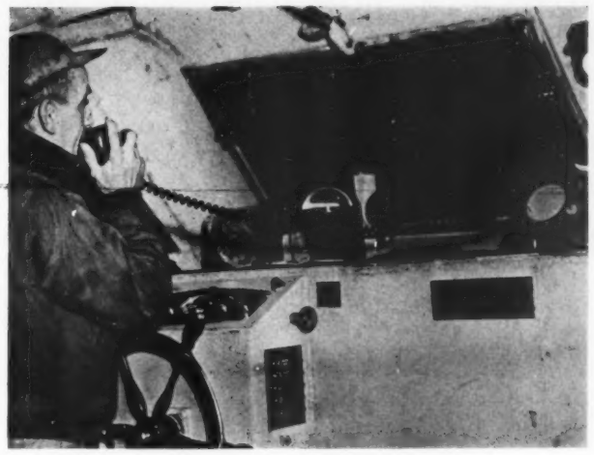
The importance of the system becomes apparent immediately as B. F. Sanders, assistant project manager for M-C&S, leaves the office to go out to the channel. In the scant quarter-mile drive between the office and personnel dock, he receives and answers a call on the 60-watt Motorola unit installed in the car. As he steps aboard the Captain Tom—one of six personnel boats on the project—he doesn't wait for the boat to clear the harbor entrance before he picks up the hand microphone of the Captain Tom's 30-watt transmitter. This time he talks to the captain of a tug which is a mere speck on the water miles away.

Then Sanders calls the foreman of a floating derrick being towed to a new location. This message is to inform the foreman that the spar buoy which marks his anchorage is 30 feet west and 75 feet north of the correct location of the pier. This information had come to Sanders earlier by radio from the survey parties. During the 20-minute boat ride, Sanders rarely puts the microphone down. In effect, he makes the rounds of the complete project while being ferried from shore to one of the floating rigs.

Like many other superintendents who have a two-way mobile radio at their disposal, Sanders always has the means to obtain quickly a knowledge of all conditions. Whether in his office, driving his car, riding in a personnel boat, or standing on the deck of a floating derrick, he is able to visit any part of the job via radio. His voice can be heard in 38 places at one time. He can ask a question and receive an answer across 50 miles of water or land instantaneously. From any spot, he can give instructions to a number of widely scattered crews and verify that the instructions were received and understood.

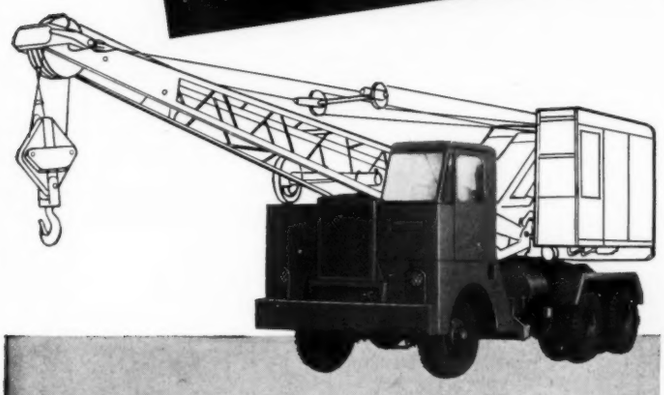
But the use of the radio is by no means confined to the assistant project manager. As the tug tows the floating derrick toward the spar buoy, the derrick foreman takes over. With the radio, he tells the tug captain just where he wants to go, just when to take up the slack, and when to cut loose. When the derrick has dropped its four anchors so it can maneuver itself into exact position, the tug captain gets his next assignment by radio directly from the job office or from the superintendent. The tug proceeds

(*Continued on next page*)



One of the personnel boats on the Mackinac job receives instructions from shore.

Picture Your Equipment



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The rugged dependability of Duplex is based on over 45 years of experience in building heavy duty trucks and special equipment. We are currently supplying undercarriages in both stock and custom models for several types of construction equipment, so you will find Duplex engineering and manufacturing facilities well equipped to help you.

Call, wire or write for complete details.

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Material Handling, Inc., working closely with its affiliate companies, Concrete Transport Mixer Company and Fleming Manufacturing Company, solves even the most difficult of material handling problems—efficiently, economically.

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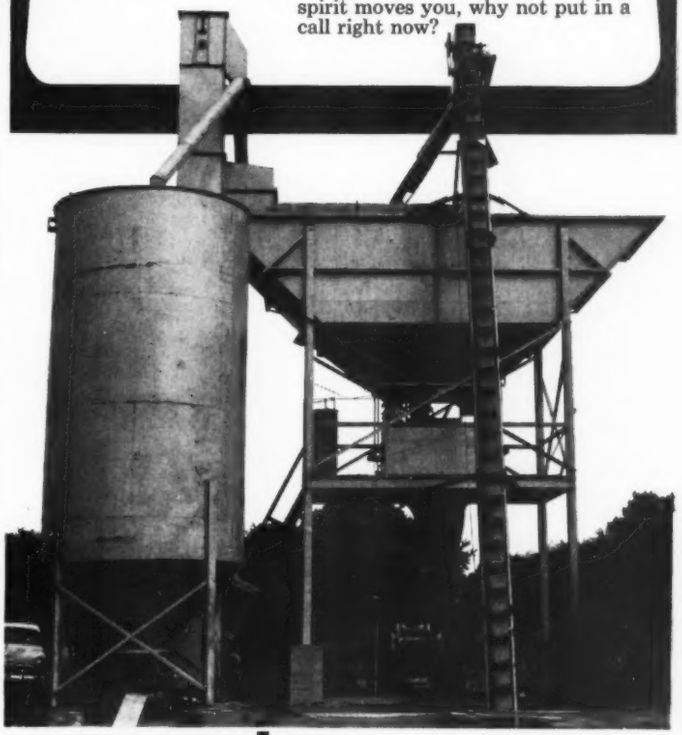

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Yes, I'm interested in a complete ready-mixed plant at a very low cost..Send more information.

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Even from his car, C. E. Haltenhoff, project engineer, keeps in touch with his field office by one of the 38 two-way radio units on the Mackinac job.

(Continued from preceding page)

to its next job without delaying to make a trip to shore for instructions.

Setting Frames

Later, as the derrick positions a cofferdam frame which will eventually be incorporated into one of the bridge piers, the radio again comes into play. Survey parties in special towers located to the side of the bridge alignment determine the exact location of the pier by triangulation. Then they radio the derrick foreman to tell him how much the frame should be moved in each direction as he shifts his anchor cables and the derrick to set the frame in its exact location.

The use of the radio is not limited to dramatic incidents like these. The foreman of a crew working on one of the piers makes radio calls to the warehouse for supplies. The warehouse calls one of the small fast boats to pick up and deliver the material. Weather reports keep crews informed of weather, wind, and current conditions at regular intervals. Tugs operate for extended periods of time without returning to shore as orders are dispatched over the radio. G. C. Denny, the project manager, receives a long-distance telephone message while he is out on the water supervising an important operation and, with the help of his secretary, Mrs. Louise Coburn, he answers the call without coming ashore.

The radio system may play other important roles as construction progresses. At first report of an accident involving a workman on an off-shore operation, all other conversation will cease. A fast personnel boat, answering the call, will get the injured man to shore as quickly as possible. While this is taking place, the extent of the man's injuries can be relayed to the base station, and a doctor and ambulance can be on hand when the boat docks. In some cases, the time saved by radio may mean life instead of death.

To say that the Motorola system has proved invaluable in coordinating operations on this bridge job would be un understatement. According to project engineer C. E. Haltenhoff, a project of this size could hardly be done without radio assistance. This is probably the best reason why men on the Mackinac project consider Station KQE279 the most important station on the air. THE END

Johnson Succeeds Tallamy As New York D. P. W. Head

John W. Johnson, vice president and general manager of the Brunner Asphalt & Construction Co., Buffalo, N. Y., is the new superintendent of New York State's Department of Public Works. He succeeds B. D. Tallamy in the $19,500-a-year post.

Governor Averell Harriman appointed Mr. Johnson, who was formerly general manager of the Buffalo Sewer Authority.

The new superintendent is a member of the American Society of Civil Engineers and was recommended for the position by the New York State Society of Professional Engineers.

Mr. Tallamy still remains as chairman of the New York State Thruway Authority, a position to which he was appointed by ex-Governor Thomas E. Dewey. Mr. Tallamy is also associated with a consulting engineering firm.

Wheel Tractor Illustrated With Backhoe Attachment

■ The Allis-Chalmers Model WD-45 wheel tractor is shown, in a new catalog equipped with the Henry backhoe and other Henry hydraulically-operated attachments.

In addition to specifications, the catalog includes illustrations of the basic unit and of the various Henry front and rear-mounted attachments. A cutaway view shows the tractor's power train.

To obtain this literature write to Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis., or return the Request Card at page 18. Write the manufacturer's name on the card.

mobile concrete mix plant on rubber

Koehring 16-E *twinbatch* rides on pneumatic tires . . . works, travels on or off pavement . . . makes self-powered moves at 9 m.p.h. Its rubber-tired mobility increases productive work-time. Its high elevating boom discharges into overhead hoppers . . . pours concrete for buildings, pilings, culverts . . . or batches into trucks. Bucket on 60° elevating boom discharges at a height of 21 feet (higher with special boom). Boom also swings in a 160° arc . . . speeds pouring of floors, footings, highway and airport strips.

This versatile 16-E easily mixes and distributes over 50 cu. yds. per hour. 7-second skip hoist, split-second Autocycle mixing, and vertical syphon-type water tank all assure consistent, maximum-strength concrete at top mixing speeds. Get all the facts from your Koehring distributor . . . or write *Koehring Co., Milwaukee 16, Wis.*

48½-foot discharge height with tower

On the Koehring 16-E, the elevating boom is interchangeable with a 40 or 60-foot tower. This gives discharge heights up to 48½ feet for pouring high columns, piers, decks and upper floors. 21½-cu. ft. hoist bucket discharges automatically into 40 cu. ft. overhead hopper. Hopper is easily positioned (at 6-inch intervals) anywhere along face of tower. Tower is raised . . . or safely lowered into horizontal carrying position . . . by the same hydraulic ram used on the elevating boom.

(Subsidiaries: JOHNSON • PARSONS • KWIK-MIX)

KOEHRING 16-E *twinbatch*®

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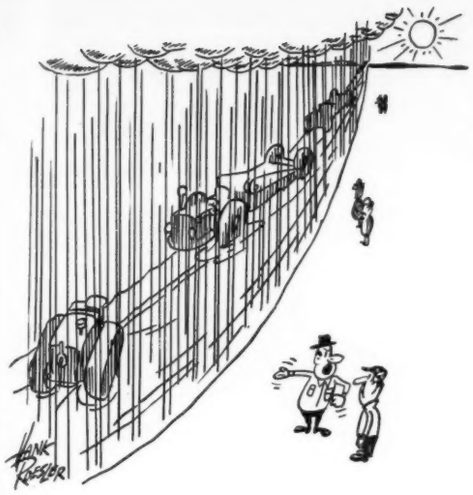


"Sure,—we gotta expect some rain!—but must it be so localized?"

New Plant Will Broaden Armco Production, Sales

Construction of a new fabricating plant for Armco Drainage & Metal Products, Inc., a subsidiary of Armco Steel Corp., has begun in Portage, Wis. Sales activities in the Wisconsin and upper Michigan area have been expanded proportionately.

Forty-ninth in Armco's network of fabricating plants, the Portage plant will produce a wide variety of corrugated metal pipe and pipe arch for use in drainage work. Complete stocks of other fabricated products of the company will be warehoused at the Portage facility, which is expected to be completed and ready for operation early this year.

The expanding Wisconsin sales organization will be headed by A. T. Rodger, Jr., who will have headquarters in Madison. Other sales offices in the state will be located at Milwaukee, Appleton, and Eau Claire, and all sales efforts will be under the direction of G. R. Betts, division sales manager. The Wisconsin activities of the company are directed by K. C. Thomas, vice president and manager of the Great Lakes division.

New Firm To Manufacture Passenger Conveyor Belts

A new company, Passenger Belt Conveyors, Inc., has been incorporated under the laws of Delaware for the purpose of engineering, developing, selling, and installing passenger belt-conveyor systems. The company is jointly owned by the Goodyear Tire & Rubber Co., Akron, Ohio, and the Stephens-Adamson Mfg. Co., Aurora, Ill.

Sam DuPree of Goodyear will serve as president and D. L. Stephens, of Stephens-Adamson, as vice president of the new firm. Other officers and directors will be drawn from the two parent companies.

The company, which will have headquarters in Akron, has bid on the passenger-conveyor system for the Grand Central-Times Square shuttle subway line in New York City and has several similar projects under consideration throughout the country.

Bituminous Distributors And Other Road Equipment

■ A new piece of literature describes the complete line of Rosco bituminous distributors, haul tanks, brooms, and street flushers. The pocket-sized booklet describes each unit and gives the sizes available for the various models.

Included in this literature is a picture of a road roller, built in 9 and 13-wheel models, that was added recently to the Rosco line.

To obtain Bulletin 54-4 write to the Rosco Mfg. Co., 3118 Snelling Ave., Minneapolis 6, or return the Request Card at page 18. Write the manufacturer's name on the card.

Ninth Parts Depot Opened by Caterpillar

A new Caterpillar Tractor Co. parts depot established in Los Angeles, Calif., is capable of providing emergency overnight service to company distributors in southern California, southern Nevada, and Arizona.

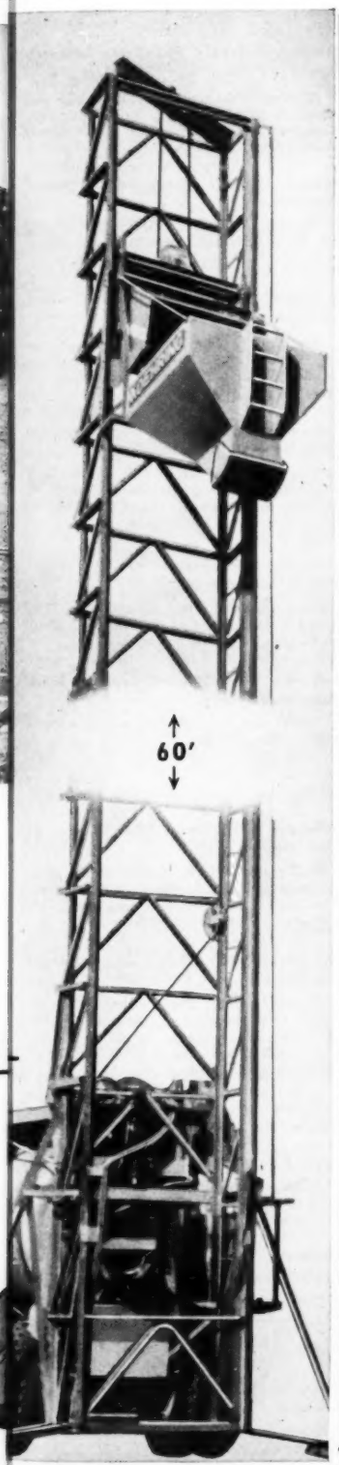
Managing the depot is James Busey. He is being assisted by Robert Webster, former export parts supervisor at the Peoria plant.

Wide Line of Jaw Crushers

■ Jaw crushers manufactured in 11 sizes by the Diamond Iron Works, Halsted St. and 48th Place, Chicago 9, Ill., are covered in a booklet available on request. Crushers illustrated range from a 6 × 12 unit to a 36 × 48 model, with capacity ratings from 1½ to 500 tons per hour.

Cutaway views show the construction of the crushers and illustrate how Diamond's "long jaw" design, combined with the impact of the overthrow of the heavy pitman, contributes to tonnage produced.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.



9¾ feet per minute with 250 Trenchliner®

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This Kwik-Mix Tower Loader fits 11-S and 16-S Dandie® concrete mixers, discharges at 9'-1" into trucks, overhead hoppers, or stockpiles. Bucket holds full batch, is powered by mixer engine and dumps automatically at top of tower. Also available for Kwik-Mix No. 10 and 14 bituminous mixers. Get complete information from your Kwik-Mix distributor, or send for literature on low-cost, time-saving Tower Loader today.

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254 to 1321-bbl. Johnson cement plants

Johnson single silos: 254 to 611 bbls. Have gasoline or electric screw conveyor and bucket elevator. Also, receiving hoppers for trucks, box-cars, hopper-bottom cars. One or two 1000-lb. batchers can be used. Larger batcher, added leg and elevator height available for charging mix-trucks. Second silo at ground level increases capacity to 1321 bbls. All silos 1-piece, all-welded, 11 or 12' diameter. Have aeration, bin signals.

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269

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Work Nears Completion On Israel Dam Project

Construction of a series of dams in Israel to supply fresh water for a potash factory near Sedom on the Dead Sea is now in its final stages. Scheduled for completion in March, the dams run parallel to the Israeli border for a distance of 23 miles.

Approximately 700,000 cubic yards of earth is being excavated and transported to the site. The dams will be 5 feet high with 2.1 sideslopes.

An estimated 250 workers, employees of joint-venture contractors Construction Aggregates Corp., Chicago, Ill., and National Engineering Co., Ltd., of Israel, are engaged in the work.

You Can't Beat This Pair of Winners for LOW COST PRODUCTION

for your ¾ and 1-yard requirements

OSGOOD-GENERAL 320

Osgood-General 320 ¾ cubic yard hoe

MARION 43-M

Marion 43-M, Heavy-Duty Dragline

Extra Profit Facts About The 320

- Fast, in-the-field conversion from hoe or shovel to crane, dragline, clamshell, pile driver.
- Large multiple disc type swing clutches give smooth, cool performance.
- Long, wide crawlers, location of deck machinery makes center of gravity far to the rear of the machine for extra stability.
- Independent worm type boom hoist powered up and down.
- Deck gears recessed in oil bath and anti-friction bearings help insure durability and reduce costly downtime.
- Torque converter for smooth operation (optional).

Extra Profit Facts About The 43-M

- Readily convertible as shovel, dragline, clamshell, crane, hoe and pile driver.
- Fast operation, easily controlled with Marion Air Control.
- Unsurpassed machine quality and dependability results from alloy steels, forgings and anti-friction bearings.
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CONVENTION CALENDAR

January 9-13 National Sand and Gravel Association and National Ready Mixed Concrete Association

Thirty-ninth Annual Convention of National Sand and Gravel Association and Twenty-fifth Annual Convention of National Ready Mixed Concrete Association, Miami Municipal Auditorium, Miami, Fla. Vincent P. Ahearn, executive secretary, NSGA, 1325 E. St. N. W., Washington 4, D. C.

January 10-13 American Road Builders' Association

Exhibit of Highway Materials and Supplies to be held in conjunction with Annual Meeting, Roosevelt Hotel, New Orleans, La. Norman T. Almquist, administrative services manager, ARBA, World Center Bldg., Washington 6, D. C.

January 11-14 Highway Research Board

Meeting, National Academy of Sciences, Washington, D. C. Fred Burggraf, director, HRB, 2101 Constitution Ave., Washington 25, D. C.

January 23-27 Associated Equipment Distributors

Meeting, Conrad Hilton Hotel, Chicago, Ill. P. D. Hermann, executive secretary, AED, 30 E. Cedar St., Chicago, Ill.

January 27-29 Associated General Contractors of Minnesota

Thirty-sixth Annual Convention, Nicollet Hotel, Minneapolis, Minn. J. R. Hendershott, manager, AGC, 910 Builders Exchange Bldg.., Minneapolis 2, Minn.

January 31-February 4 American Society for Testing Materials

Spring Committee Week, Netherland Plaza Hotel, Cincinnati, Ohio. George A. Wilson, senior assistant editor, ASTM, 1916 Race St., Philadelphia, Pa.

February 7-9 Association of Asphalt Paving Technologists

Meeting, Jung Hotel, New Orleans, La. Ward K. Parr, secretary-treasurer, AAPT, P. O. Box 376, Ann Arbor, Mich.

February 7-9 National Crushed Stone Association

Thirty-eighth Annual Convention Netherland Plaza Hotel, Cincinnati, Ohio. J. R. Boyd, administrative director, NCSA, 1415 Elliot Place N. W., Washington 7, D. C.

February 7-11 American Society of Civil Engineers

Convention, U. S. Grant Hotel, San Diego, Calif. ASCE Housing Committee, San Diego Convention Bureau, 449 W. Broadway, San Diego, Calif.

February 14-16 Quality Concrete Short Course

Fourth Annual Short Course, Georgia Institute of Technology, Atlanta, Ga. R. E. Eskew, coordinator of short courses and conferences, Georgia Institute of Technology.

February 14-16 High-Speed Computer Conference

Conference, Pleasant Hall, Louisiana State University campus, Baton Rouge, La. Dr. J. W. Brouilette, director, General Extension Division, Louisiana State University.

February 18-19 National Society of Professional Engineers

Annual Spring Meeting, Hotel Charlotte, Charlotte, N. C. Kenneth E. Trombley, NSPE, 1121 15th St. N. W., Washington 5, D. C.

February 21-24 American Concrete Institute

Fifty-first Annual Convention, Schroeder Hotel, Milwaukee, Wis. William A. Maples, secretary-treasurer, ACI, 18263

W. McNichols Road, Detroit 19, Mich.

February 21-24 Cornell Turf Conference

Meeting, Statler Hall, Cornell University, Ithaca, N. Y. Dr. J. F. Cornman, Department of Ornamental Horticulture, Cornell University.

February 24-25 Highway Engineering Conference of University of Colorado

Twenty-eighth Annual Conference, University of Colorado, Boulder, Colo. Roderick L. Downing, conference chairman, Department of Civil Engineering, University of Colorado.

March 1-3 Illinois Highway Engineering Conference

Meeting, Illini Union, Urbana, Ill. William S. Pollard, Jr., assistant conference director, 303 Civil Engineering Hall, University of Illinois.

March 2-4 Association of Highway Officials of North Atlantic States

Meeting, Hotel Traymore, Atlantic City, N. J. A. Lee Grover, secretary-treasurer, AHONAS, 1035 Parkway Ave., Trenton, N. J.

March 7-9 Utah Highway Engineering Conference

Sixteenth Annual Conference, University of Utah, Salt Lake City, Utah. A. Diefendorf, conference director, University of Utah.

March 7-11 American Congress on Surveying and Mapping and American Society of Photogrammetry

Consecutive meetings, Shoreham Hotel, Washington, D. C. Fowler Barker, deputy for public relations for ACSM and ASP, 17 Dupont Circle, Washington, D. C.

March 7-11 National Association of Corrosion Engineers

Annual Conference and Exhibition, Palmer House, Chicago, Ill. A. B. Campbell, executive secretary, NACE, 1061 M & M Bldg., Houston 2, Texas.

March 9-12 American Concrete Pipe Association

Forty-seventh Annual Meeting and Convention, Sheraton-Plaza Hotel, Boston, Mass. Howard F. Peckworth, managing director, ACPA, 228 N. La Salle St., Chicago 1, Ill.

March 14-17 Associated General Contractors of America

Meeting, Roosevelt Hotel, New Orleans, La. C. I. Mehl, administrative assistant, AGC, 1227 Munsey Bldg., Washington 4, D. C.

March 15-17 Michigan Highway Conference

Meeting, Pantlind Hotel, Grand Rapids, Mich.

March 23-25 New York State Association of Highway Engineers

Sixteenth Annual State Convention, Hotel New Yorker, New York, N. Y. Fred F. Liguori, convention chairman, NYSAHE, P. O. Box 551, Poughkeepsie, N. Y.

April 5-7 Ohio Highway Engineering Conference

Meeting, Museum Auditorium, Ohio State University, Columbus, Ohio. Emmett H. Karrer, professor of civil engineering, Brown Hall, Ohio State University.

Data on Round Molds For Concrete Columns

■ Round molds for reinforced-concrete column construction are illustrated in a folder from Deslauriers Column Mould Co., Inc., 5036 W. Lake St., Chicago, Ill. Specifications list mold sizes for 12 to 42-inch column diameters.

The forming characteristics of the molds are described, and accessories including two capitals, a beam fitting, and floor openings are illustrated. Photos show some typical jobs on which this type of construction has been used.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Battery-Check Feature Improves Pipe Detector

■ The Model 505 pipe detector made by the Detectron Corp., 5420 Vineland Ave., North Hollywood, Calif., is now equipped so that the operator can be sure of maximum battery function while detecting, tracing, and estimating the depth of buried pipes, cables, and conduit. A battery test switch instantaneously tests both transmitter and receiver batteries.

Among other new features, the Detectron 505 offers the latest electronic tubes, a specially constructed vibration pickup for maximum sensitivity, and an aluminum case. The instrument uses standard batteries.

For further information write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

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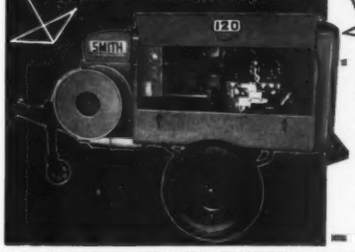

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After oversize material is kicked out by the grizzly setup in the foreground, remaining raw aggregate is passed through a Cedarapids primary crusher, along the short conveyor to an Overstrom screen deck, and finally up the long conveyor to a Ty-Rock screen deck over the stone bins at left.

Ray Day Photo

Concrete for tunnel arch precedes invert pours

Deep under the Wasatch mountain range of Wasatch National Forest near Ogden, Utah, tunnel crews of the Utah Construction Co., Salt Lake City, have brought the concrete lining of Gateway Tunnel to completion in an unusual manner. Arch lining—a 5-inch minimum thickness of concrete reaching back to the rock lines—was placed ahead of the invert pour, reversing normal tunnel-lining procedure.

Utah Construction's work is part of a $2,486,613 contract with the U. S. Bureau of Reclamation. The job includes the complete Gateway Tunnel project, involving both excavation and concrete work.

Gateway Tunnel is 17,204 feet long. Its horseshoe-shaped section finishes off inside at a height of 9 feet 4 inches. The tunnel has a fall of 17 feet between its inlet and outlet portals. It has no breather shafts or other appurtenant works.

The tunnel is a part of the comprehensive Bureau of Reclamation Weber Basin Project (see "Gateway Tunnel Is Started for Weber Basin Project," C. & E., June, 1954, pg. 56). All surplus water in the basin will be used to develop new lands and supplement irrigation to already developed areas. The project consists of a system of reservoirs, channels, power plants, and aqueducts, in addition to the tunnel. It is a typical Bureau of Reclamation project which utilizes the water from a major watershed for the good of people living in the lands below.

Excavation of the main tunnel section began January 26, 1953, and the tunnel was holed through more than a year later. Completion of the concrete-lining work came last month. There was a constant problem with heavy ground water during both the excavation and lining stages, but the flow was handled successfully throughout the project.

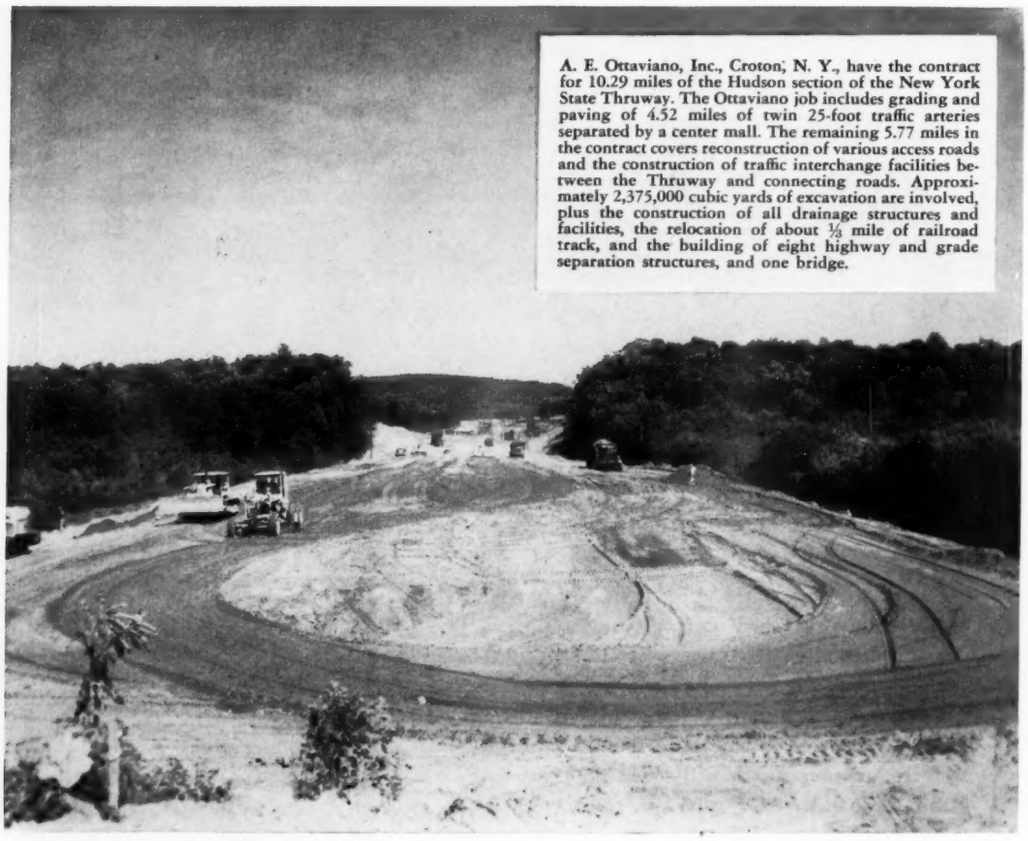
Fast Lining Work

All last summer, concrete-lining operations were carried on 24 hours a day five days a week. The work was essentially the same as slip-form pour because, with only a few excep-

GULF PRODUCTS *and* FINE SERVICE

keep equipment rolling

on New York State Thruway



A. E. Ottaviano, Inc., Croton, N. Y., have the contract for 10.29 miles of the Hudson section of the New York State Thruway. The Ottaviano job includes grading and paving of 4.52 miles of twin 25-foot traffic arteries separated by a center mall. The remaining 5.77 miles in the contract covers reconstruction of various access roads and the construction of traffic interchange facilities between the Thruway and connecting roads. Approximately 2,375,000 cubic yards of excavation are involved, plus the construction of all drainage structures and facilities, the relocation of about ⅓ mile of railroad track, and the building of eight highway and grade separation structures, and one bridge.

THE New York Thruway is another tremendous and important project where Gulf tops the list of suppliers of petroleum products. Twenty leading contractors on the Thruway, with a total of 43 jobs, rely on Gulf to help keep equipment delivering top performance.

A. E. Ottaviano, Inc., for example, know from experience that Gulf quality lubricants provide better protection against mechanical delays. And that Gulf fuels help them gain an extra margin of engine power and efficiency. Then too, they appreciate the helpful engineering counsel that Gulf provides, as well as Gulf's prompt delivery service.

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Concreting setup operates smoothly and at good speed on 17,204-foot bore for western irrigation project

tions, the arch-lining operation continued without interruption.

To get set up for such a smooth-running continuous concreting operation, Utah Construction's management brought in 312 feet of special steel forms in 24-foot-long sections. These had originally been made for Duchesne Tunnel, a 9-foot 3-inch horseshoe-shaped bore in the high mountainous country near Kamas, Utah. By simply adding one inch to the height of the forms, Utah had tailor-made units for this job.

These sections are designed to be handled by a powerful form jumbo which can move under a form, pick it up after it has been collapsed, and bring it on ahead. The form sections had hinged joints and Rodgers jacks at strategic locations, which permitted the lower wings to retract themselves or to extend themselves when the forms were being set up for the pours.

Reversed Procedure

The decision to pour the arch portion of the lining ahead of the invert was not made lightly. Tunnel men like to pour the invert first, as it gives later operations a firm footing. But the method has one disadvantage. When the invert is placed first, concrete from later pours along the arch sometimes tends to spill, and the resulting cleanup job is a financial headache for the contractor. This factor, coupled with the desire for speed and efficiency, caused Utah to decide to tackle the arch pour first.

The 9-foot 4-inch-high tunnel ceiling and its proportionately narrow walls limited the working space so much that considerable ingenuity was called for in designing a concrete-lining setup which would operate rapidly and at low cost. Such a setup was planned and operated in accord with the scheme of using collapsible steel forms. The form crew, for example, required a labor force of only four form setters, a jumbo operator,

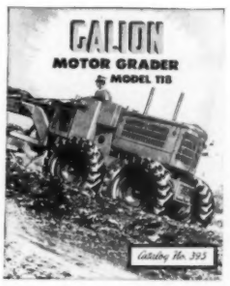
(Continued on next page)

A conveyor carries sand to the top of the Noble semiautomatic batch plant as part of the 18-car concrete-hauling train stands by.

Ray Day Photo

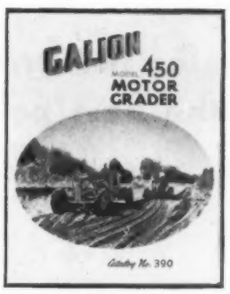
INTERESTING LITERATURE on Construction Equipment

Free copies of these motor grader and roller catalogs are available to anyone having an interest in such equipment.



Model 118 tandem drive motor grader, 115 or 125 h.p. diesel engine.

Model 104 tandem drive motor grader, 93 h.p. diesel engine. Gasoline engine available.



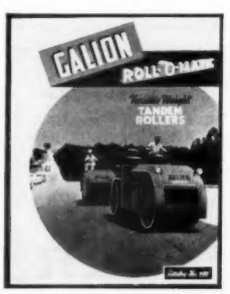
Model 450 tandem drive motor grader, 75 h.p. diesel engine. Gasoline engine available.

Model 303 tandem drive motor grader, 55 h.p. diesel engine. Gasoline engine available.

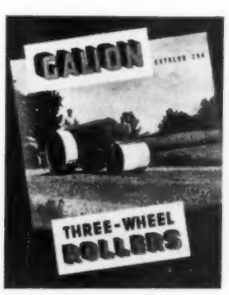
Model 503 tandem drive motor grader, 50 h.p. gasoline engine. Diesel engine available.

A trench roller especially designed for compacting materials on road widening jobs.

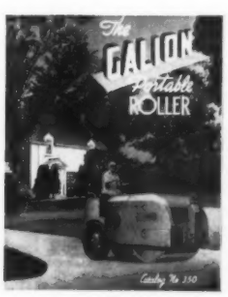
A 4-6 ton tandem roller with hydraulically retractable towing wheels for easy portability from job to job.



Tandem rollers with ROLL-O-MATIC torque converter drive. Four variable weight sizes. Gasoline engine. Gear shift models (without torque converter) available.



3-Wheel rollers. Five sizes with cast or variable weight steel rolls. Diesel or gasoline engine.



Portable roller. Variable weight. 7100-9765 lbs. Gasoline engine.

Small tandem roller, 3-5 ton variable weight. Gasoline engine.

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- ☐ ROLL-O-MATIC Tandem Rollers
- ☐ Three-Wheel Rollers
- ☐ Portable Roller
- ☐ 3-5 Ton Tandem Roller

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Lengths up to 36". Standard diameters from 3/16" to 5". Other diameters up to 8" on special order. Use with standard electric drills or air motors. FREE FACTORY SERVICING.

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Dry-batched material travels up a 36-inch conveyor and dumps into a dual Rex mixer setup. Low clearance in the tunnel was a serious problem in rigging for the lining operation.
Ray Day Photo

(Continued from preceding page)
and a foreman.

One of the most serious "bugs" at the start of concrete-lining operations was discovered in the form surfaces themselves. It had been many months since Duchesne Tunnel was built, and the surfaces of the forms had become rusty. The forms were also pitted to some extent. Lining began at the east or upstream portal, and before a good start had been made, the contractor saw that the forms themselves were slowing the operation.

In spite of the fact that a recommended form oil was being used on the surfaces, it was impossible to retract the form wings without concrete sticking to the surface. Valuable time was lost while men with electric-powered steel brushes buffed the surfaces, trying to smooth the steel so that the concrete would not stick.

The problem got worse, and it lasted for several weeks. It was finally solved, almost by accident, when a field representative of Standard Oil Co. of California visited the job. He recommended Standard aqueduct form oil, a castor-oil base with a mineral additive, and its use resulted in immediate disappearance of the sticking trouble. The steel faces of the forms took on new smoothness as the oil entered the pores. The terrific labor cost of buffing and troublesome cleaning dropped immediately by 80 per cent or more. More important, concrete-lining production—which often had been slowed down considerably by form trouble—speeded up immediately by approximately 15 per cent. Utah's worst headache was over.

Streamlined System

The concrete-lining setup started at the central yard near the west tunnel portal with a Noble semiautomatic batching plant. Its capacity was considerably above what the tunnel-lining equipment could handle. The batch plant was a straight stock model, except for the addition of secondary sizing screens on top. These were necessary to meet the re-sizing requirements of Bureau of Reclamation specifications.

The Noble batch plant received concrete aggregates produced in an outwash plain at the foot of Weber Canyon about one mile below the tunnel portal. A subcontract for the production of these aggregates was set up between Utah Construction Co. and Clarence Waterfall of Ogden. The Weber Canyon aggregate deposit is one to make a concreting contractor envious. The heavy deposit has well-graded rock in practically every size without excessive oversize material. The pit producing Gateway Tunnel's aggregate had a face 90 feet deep, but there were other commercial deposits in the same vicinity which had reached a 215-foot depth before ground water became a problem.

Clarence Waterfall's production setup started with a Northwest 1-yard shovel loading the raw pit-run material to a fleet of GMC and International dump trucks. These trucks dumped the raw material over a grizzly setup which kicked out the plus-10-inch oversize rock. The remaining material then passed through a Cedarapids 10×6 primary crusher driven by a 50-hp electric motor. Material passing through the crusher then was sent to an Overstrom screen deck, which passed acceptable material directly on up to the plant and screened out the oversize to a set of roll crushers arranged in closed circuit with the Overstrom screens.

The material, at this point considerably reduced in size, then passed uphill to a triple 5×10-foot Ty-Rock

From Every Standpoint/output · size · efficiency

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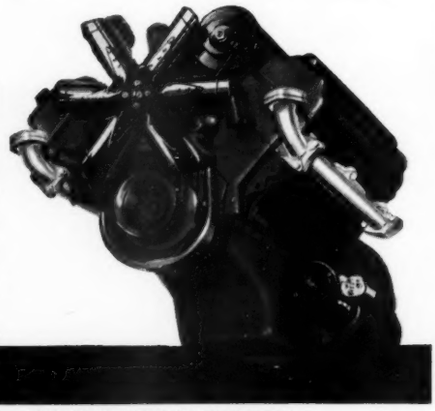

Chrysler Industrial V-8 Engines are . . . pound for pound . . . the world's most powerful gasoline industrial engines.

To prove that statement—let's look at the facts. In the charts below, we compare Chrysler Ind. 24A V-8 Engine with similarly equipped products of five principal competitors. Information on each competitive engine is based upon factory specifications. Check the Chrysler advantages—each of them is an important factor in the selection of a power plant.

Engine	Horsepower and Piston Displacement	Pounds per Horsepower	Fuel Consumption—pounds per BHP per hour	Horsepower per Cubic Inch Displacement	
Engine A	110 at 2200 RPM 358 cu. in.	(Stripped Engine) 7.38	.54	.307	**CHRYSLER ADVANTAGES OVER ENGINE A** . . . delivers 18 more horsepower . . . weighs 96 pounds less with 24% less weight per horsepower . . . uses 7.5% less fuel at average operating speed . . . delivers 26% more horsepower per cubic inch displacement
Chrysler Model Ind. 24A	128 at 2200 RPM 331 cu. in.	(Stripped Engine) 5.58	.50	.387	
Engine B	104 at 2400 RPM* 330 cu. in.	(Stripped Engine) 6.92	(Information not available)	.315	**CHRYSLER ADVANTAGES OVER ENGINE B** . . . delivers 34 more horsepower . . . weighs 5 pounds less with 25% less weight per horsepower . . . delivers 32% more horsepower per cubic inch displacement
Chrysler Model Ind. 24A	138 at 2400 RPM 331 cu. in.	(Stripped Engine) 5.18	.50	.416	
Engine C	99 at 2200 RPM 320 cu. in.	(Stripped Engine) 7.64	.56	.309	**CHRYSLER ADVANTAGES OVER ENGINE C** . . . delivers 29 more horsepower . . . weighs 60 pounds less with 27% less weight per horsepower . . . uses 10.5% less fuel at average operating speed . . . delivers 25% more horsepower per cubic inch displacement
Chrysler Model Ind. 24A	128 at 2200 RPM 331 cu. in.	(Stripped Engine) 5.58	.50	.387	
Engine D	117 at 2200 RPM 317 cu. in.	6.5**	.50	.369	**CHRYSLER ADVANTAGES OVER ENGINE D** . . . delivers 11 more horsepower . . . weighs 19 pounds more *but* with 6% less weight per horsepower . . . delivers 5% more horsepower per cubic inch displacement
Chrysler Model Ind. 24A	128 at 2200 RPM 331 cu. in.	6.1**	.50	.387	
Engine E	97 at 2200 RPM 372 cu. in.	(Complete Engine) 12.85	.58	.260	**CHRYSLER ADVANTAGES OVER ENGINE E** . . . delivers 31 more horsepower . . . weighs 395 pounds less with 48.7% less weight per horsepower . . . uses 14% less fuel at average operating speed . . . delivers 49% more horsepower per cubic inch displacement
Chrysler Model Ind. 24A	128 at 2200 RPM 331 cu. in.	(Complete Engine) 6.6	.50	.387	

**Information not available at 2200 RPM* ***Complete engine less flywheel housing*

These are not just "paper advantages". They show up on irrigation pumps, in construction and road building equipment, in farm combines, and in many other applications. Thanks to modern engineering, hemispherical-design combustion chamber, short-stroke, low-friction construction, Chrysler offers durability and output in amazingly small, lightweight power packages.

And remember Chrysler Industrial Engines can be factory equipped for operation with gasoline, natural or L-P gas.

See a dealer or write: Dept. 111, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.

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INDUSTRIAL

ENGINES
Horsepower With A Pedigree

INDUSTRIAL ENGINE DIVISION
CHRYSLER CORPORATION

BETTER THAN THE BEST BUT PRICED WITH THE LOWEST

screen deck, which classified the material into five sizes: 1½ to ¾ inch; ¾ to ⅜ inch; ordinary sand; masonry sand; and concrete or plaster sand. The raw pit-run material was so carefully graded and so dry that, for the most part, even the sand could be produced without washing. On damp days, however, when the presence of moisture in the pit-run material tended to clog up screen decks, a water jet was used over the finer screens to force the material through.

Finished aggregates were taken from a surge bin at Waterfall's plant and trucked to the Noble batching setup. Concrete aggregates could be dumped direct as needed and loaded into the Noble plant batching hoppers by means of a long elevating conveyor. The plant also had 500-barrel storage capacity for bulk Ideal cement.

Concrete Mix

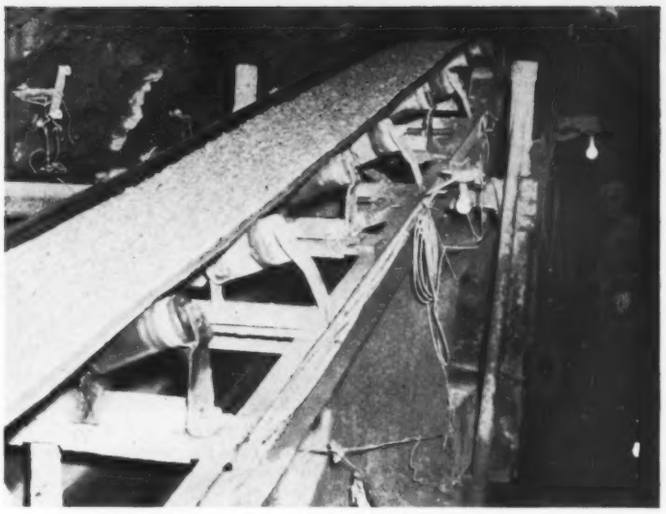
Each batch leaving the Noble plant measured ⅝ cubic yard. The concrete used in the lining operation consisted of a 5.7 sack mix per cubic yard, with 1½-inch-maximum aggregate and enough Protex air-entraining agent added to entrain approximately 4 per cent of air. The addition of this agent was calculated to make the concrete much more workable as it went in the forms. Each ⅝-cubic-yard dry batch of concrete was dropped from the Noble batch plant into special cement-hauling cars which were made for the Utah Construction Co. on special order by Coeur d'Alene Hardware & Foundry Co., Wallace, Idaho. The cars consisted of dry batch concrete bodies made to fit the Granby-type muck cars which were used when the tunnel was in the excavation stage. There were 18 such cars available for concrete hauling.

General procedure was to maintain six trucks in loaded position on the railroad siding, six en route to the tunnel or being unloaded, and six on the way out or being loaded near the Noble batch plant. A train of six cars was hauled by a Greensburg electric locomotive, of which there were three on the project.

Handling of these cars at high speed was accomplished with ease by means of a California switch arrangement, which was carried on through the tunnel as lining work progressed. Cars were handled from the California switch to a special ramp track by pulling them up with a Joy Turbinair hoist. The dry batches were then dumped directly to a 36-inch belt-conveyor system leading up to a dual bank of Rex 16-S concrete mixers, where the Protex and mixing water were added.

Coming out of the dual bank of mixers, the fresh concrete dumped to a 24-inch wet belt conveyor, which elevated it rapidly and at high speed to a hopper over a Press-Weld pneumatic concrete placer. From the Press-Weld gun the fresh concrete was injected under high pressure and considerable velocity into the steel form jumbo, which had been set up and placed in position. The steel form, incidentally, was carried at the base on a special concrete curb which had been placed previously. This curb formed an integral part of the pay

(*Continued on next page*)



This 24-inch wet conveyor hoists freshly mixed concrete to the Press-Weld gun. Dry-batched concrete is mixed inside the tunnel in Rex 16-S mixers.

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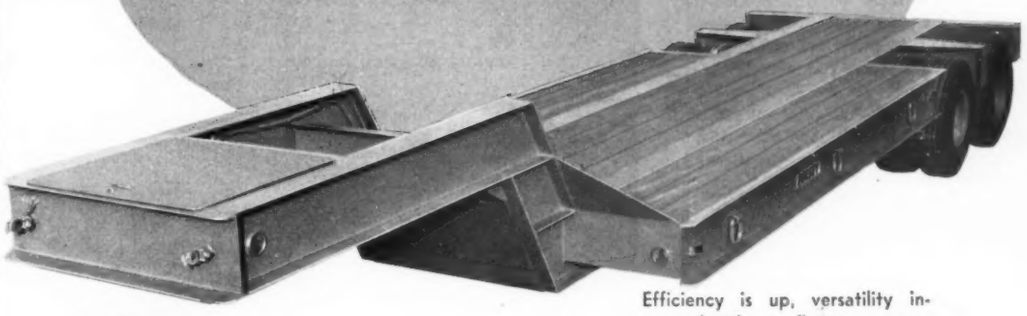

DORSEY

Efficiency is up, versatility increased with new flat-type gooseneck. Model HTS Dorsey machinery trailers available in capacities from 15 to 35 tons.

You'll get new strength and durability as well as 2,400 pounds more carrying capacity. New design with high-tensile steel means more loads within legal limits. Stub axles in tandem on sturdy walking beams mean easy pulling and load stability. The Dorsey HTS is delivered ready for work: brakes, tool box and recessed lights are standard.

Look under the deck. This rugged, built-in difference can mean bigger loads, more miles and years of trouble-free service.

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DORSEY TRAILERS ELBA, ALABAMA

A worker operates levers which control the Press-Weld gun used in placing the concrete for the arch lining. Concrete is dumped from the overhead hopper into the Press-Weld pneumatic concrete placer just below.

Ray Day Photo

(*Continued from preceding page*)

concrete of the tunnel-lining system.

It was necessary on the initial pours to be extremely careful about keeping the pneumatic concrete-placing pipe well embedded in concrete and to use a low-velocity discharge. On the first pour some trouble developed when the high velocity of concrete displaced a rubber waterstop. Later on, a good system of signals was devised so that the forward movement of the lining equipment and the Press-Weld gun was controlled by the nozzle man. By means of this system, the nozzle man could signal his intention to move, the mixer men and the Press-Weld gun operator could signal their readiness, and the move could then be made safely. The injection of concrete under force was stopped while a move was made,

As the Press-Weld gun shot forced concrete into the forms, Viber vibrators were used for external and internal consolidation. Two external-type machines, bolted to the form sections and moved ahead as necessary, aided two internal vibrators—operated from trapdoors in the forms —in vibrating the concrete.

Production

Except for weekend stops, the concreting was a continuous operation. Crews averaged 275 feet of arch lining per day, with a peak pouring day of 424 feet. This rate of progress allowed the concrete from 14 to 16 hours, or slightly more, to set up before the last 24-foot form section was stripped from the tail end of the tunnel and moved up toward the mixer. With all the "bugs" removed from the arch lining work, it became a steady high-speed operation.

In placing the concrete for the invert the contractor had to cope with relatively high ground water flows, which had been found all the way through the tunnel during excavation work. The method of controlling or handling this ground water involved a system of perforated war-surplus pipe placed in a 6-inch trench. This pipe was covered by a French drain so that the invert could be dried up prior to concrete placing.

Like the arch lining, the invert concrete work started from the east or upstream portal and worked progressively toward the batch plant. The use of the Press-Weld gun was discontinued for this operation; instead, the wet conveyor leading to the gun was lengthened and joined to a rolling bridge section carrying a conveyor and terminating at a discharge chute. This bridge rolled along on special rubber wheels carried on a narrow haunch as a part of the arch lining. As the invert was poured, it was given an internal vibration and then finished off smooth by a special traveling screed. This screed was designed to weigh approximately 10 tons when fully ballasted. Screeds of this general design have been used on other tunnels with a great deal of success.

In spite of ground water and fractured rock, which had to be anchored by roof bolts, tunnel excavation at one time reached a high of 87 feet per day. The highest 6-day excavation week saw 431 linear feet bored; the highest 7-day period, 506 linear feet; and the highest 31-day period, 2,138 feet.

Personnel

Utah Construction Co.'s operations were under the general supervision of H. C. Miller, project manager, with J. D. Kimsey as first assistant, J. M. Rapp as project engineer, L. A. Stallard and W. A. Walker as shift walkers, Don Roberts as master mechanic, and John Gately as chief electrician.

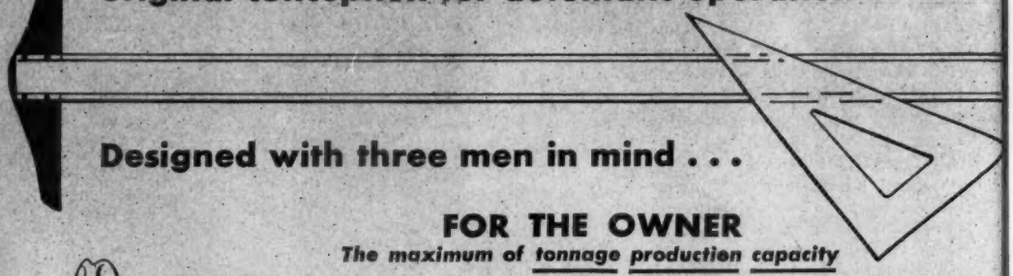
For the U. S. Bureau of Reclamation, all field construction work on the Weber Basin project is under the direction of Clinton D. Wood, project engineer. L. R. Dunkley is construction engineer. Field operations on Gateway Tunnel were under the general supervision of Ross Billings, resident engineer, with Reed Gunderson and Ted Nielsen as assistants.

THE END

introducing the

Barber-GreeneB

The first batch-plant ever designed from its original conception for automatic operation



Designed with three men in mind . . .

FOR THE OWNER

The maximum of tonnage production capacity

ALL SIZES OF AGGREGATE, INCLUDING THE MINERAL FILLER, ARE WEIGHED SIMULTANEOUSLY. Total weighing time for all ingredients is considerably less than the shortest mixing time in any specification. The only limit on hourly production is the specified mixing time. The completely new pugmill principle gives *thorough coating in less time than any other pugmill manufactured today*. When a minimum mixing time is *not* specified, complete coating can be obtained and the tonnage output increased to far above the production of plants of comparable pugmill capacity. Virtually no time lost in discharging. Full-opening bottom gives instantaneous discharge without segregation.

The maximum of flexibility

The plant may be "preset" for all-day production of the same mix in repetitive cycles, and *instantly* switched for a new mix for the "drive-in" customer. *Sooner than the next truck can drive under*, the plant is back to its preset proportions and in repetitive cycle operation again.

FOR THE OPERATOR

A new ease and simplicity of operation

Automatic Operation. **With the proportions preset, the operator locks in the "cycle" button when a truck drives under. The plant then automatically goes through complete cycles, *including discharging to the truck*. If he merely pushes the automatic button (without locking it), the plant goes through the complete cycle up to the point of discharging.**

Manual Operation. **For individual loads or other "drive-in" trade, the operator instantly disengages the preset combinations and weighs out each size of aggregate in ordinary batch-plant fashion. Operating one valve resets the preset proportions.**

Using preset proportions, the operator can manually weigh the materials by either operating one valve to *WEIGH ALL SIZES SIMULTANEOUSLY*, or operating the individual bin valves to weigh each size separately. In either of these cases, *no skill or judgment is required for accuracy*. The preset combinations control the proper weight.

FOR THE INSPECTOR

At any time, the inspector can quickly check the *weight* of the *asphalt*, the *weight* of *each size of aggregate*, the *weight* of the *mineral filler*, or the *weight* of the *total aggregate*.

The plant *automatically extracts a true cross-sectional sample* of the aggregate in each bin as part of its regular operating cycle. Normally this sample is fed into the next batch, but at any time the inspector can remove this sample for a gradation check. The plant can be set so that the cycle will be interrupted if there is any variation from the preset proportions.

"Guess you'll have to make more than one trip, Joe."

BITUMINOUS

eBatch Plant

Here is the most revolutionary development in the field of bituminous paving since Barber-Greene introduced the continuous plant over a quarter century ago.

Automatic Controls

The electric controls are simple 110-volt A.C. circuits. There are *no* electronic devices. The automatic measuring itself is *not* dependent on the electrical controls. If for any reason the operator wishes or needs to operate without the electrical controls, he may do so, and no skill or judgment is required.

When continuous type? When batch type?

The superior performance of the new Barber-Greene Batch-Plant is *not* reason for switching to batch-plants in applications where a continuous-type plant will serve.

No batch-plant, not even the new Barber-Greene, can compete with the continuous plant for highway work, or any application where high tonnage production and portability are important factors.

The basic advantages of the continuous principle continue to exist, and the continuous plant should and will continue to be the most popular.

However, where the batch principle is preferred, primarily for the purpose of serving frequent "drive-in" trade, requiring different mixes during the day, Barber-Greene now offers the outstanding batch-plant of the field.

For years, Barber-Greene has produced more asphalt plants than all others combined. We continue to offer the most comprehensive line of bituminous equipment of any manufacturer.

55-1-WB

Barber-Greene

AURORA, ILLINOIS, U.S.A.

BG

WRITE for INFORMATION

descriptive literature . . . sound movies

cost studies . . . nearby job inspection . . . plant layouts

Details on Operating Four-in-One Attachment For Tractor-Loader

■ A single front-end attachment that can be adjusted from the tractor cab to operate as a tractor-loader, bull-clam, clamshell, or bulldozer was introduced a few weeks ago by the Drott Mfg. Co., 3841 W. Wisconsin Ave., Milwaukee 8, Wis. The company now offers a folder giving complete details on the operation of the versatile attachment.

Drawings show exactly how the unit performs a variety of jobs. Specifications give details on the work capacity that may be expected from the machine.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Hauling Trailers Offered In Wide Capacity Range

■ A complete line of heavy-duty low-bed and platform trailers is illustrated in a folder from Transport Trailers, Inc., 1200-34 12th St. S. W., Cedar Rapids, Iowa. These units are available in capacities up to 100 tons.

Cargo carriers shown include a tandem-axle unit with four dual wheels. This unit is available with a flat or drop deck. Other tandem-axle haulers are gooseneck-type and tow-type tilt-top units, and models with two and four oscillating axles. Single-axle units are also shown.

The folder describes several small tilt-top trailers in the 6 to 25-ton range.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Steel-Frame Truck Cover

■ A steel-frame cargo cover for ½ and ¾-ton pickup trucks as well as 1½-ton stake and platform trucks with 12 and 14-foot bodies is shown in a bulletin from Dixie Tallyho, Inc., Fairburn, Ga. The cover is made of a double-stitched heavy-duty waterproof fabric.

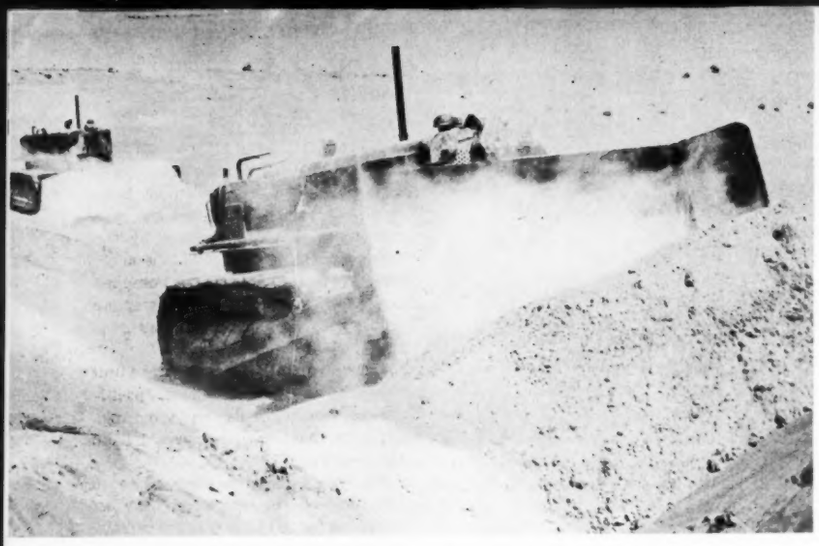
The frame of the Utilitop cargo cover is constructed of 1-inch tubular steel, and has seven longitudinal rafter supports. Upright supports are of 1⅛-inch tubular steel.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card and return it to *Contractors and Engineers.*

Col. Cassidy Named South Pacific Engineer

Col. William F. Cassidy has been appointed to the post of South Pacific division engineer, U. S. Army Corps of Engineers, San Francisco, Calif., to succeed Col. Paul D. Berrigan, who has been assigned to the Far East.

Formerly assistant South Pacific division engineer, Col. Cassidy is a native of Nome, Alaska, and is a 1931 graduate of the United States Military Academy. He has seen service as assistant to the district engineer, Portland, Oreg., and as deputy to the president of the Mississippi River Commission and to the division engineer of the Lower Mississippi Valley Division at Vicksburg, Miss.



Local material builds asphalt road in desert

Big Caterpillar tractors with dozer blades plow through sand dunes to build an embankment for the 24-mile asphalt highway between Abqaiq and Dhahran in Saudi Arabia.

Arabian American Oil Co. Photos

A new asphalt highway nearing completion in some of southwestern Saudi Arabia's roughest desert terrain employs local material in its subgrade, base, and surface courses. A huge spread of grading and paving equipment is at work on the road, which is expected to be ready for use early this year.

The Arabian American Oil Co. is building the new facility to relieve congestion in and around the industrial areas of the firm's oil operations. The 24-mile-long highway will connect the Aramco industrial communities of Dhahran and Abqaiq.

When construction began last June, big Caterpillar bulldozers working three abreast toppled sand dunes as much as 35 feet high to form a fill for the road. This operation actually meant resituating the dunes to form a causeway for the 24-foot-wide roadway. Fifty Caterpillars and many other pieces of equipment moved a total of 1,500,000 cubic yards of sand during this phase of the project.

Marl, exposed when cuts were made in the sand, was utilized for the base course. The material was found in layers only about 18 inches deep, however, so that crews had to borrow the material from areas as far as 7,000 feet from the right-of-way.

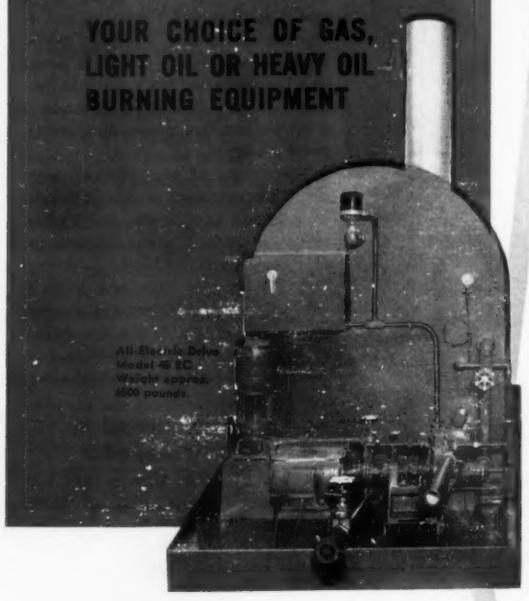
The marl was crushed to the size of gravel. Spread along the sand base on the causeway, it was compacted by two passes of a sheepsfoot roller.

HY-WAY

Announces

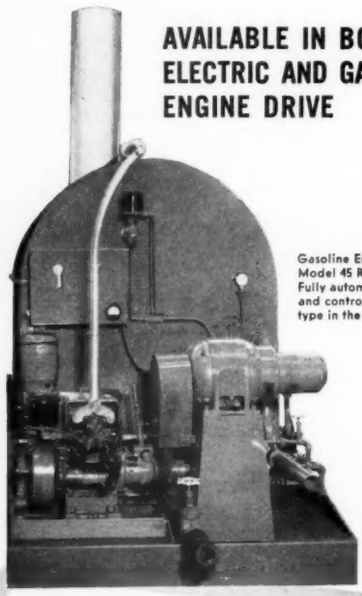
THE NEW "RC" MODELS

YOUR CHOICE OF GAS, LIGHT OIL OR HEAVY OIL BURNING EQUIPMENT



All-Electric Drive Model 45 RC. Weight approx. 4500 pounds.

AVAILABLE IN BOTH ELECTRIC AND GASOLINE ENGINE DRIVE



Gasoline Engine Drive Model 45 RCG Fully automatic burner and controls. First of its type in the field.

Hy-Way—first and foremost in hot oil heating—now offers two brand-new units . . . the "RC" Series . . . designed for increased efficiency, lower operating cost, and minimum maintenance. Standard features on all models include:

- New Open Wiring Electrical Panel.
- Wet Plate Baffle—Exclusive Hy-Way Design.
- Fully Insulated.
- Portable.
- Skid-Mounted.
- Fully Automatic Controls and Equipment.
- BTU Rating Output—1 Million to 4 Million.
- Width 5' 4"—Length 13'—Height 6' 6".

Hy-Way Heaters are used throughout the world—from Saudi Arabia to Greenland. Write today for complete details and free literature.

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A 3-inch course of asphaltic concrete is laid along one-half of the Abqaiq-Dhahran highway by a Barber-Greene finisher. Marl is used in both the 15-inch base and the asphaltic surface course.

Compaction reduced the base course to a solid 15-inch layer. Water for compaction was obtained first by tapping adjacent water lines, and then by using 3,500-gallon tank trucks.

Some of the marl also was used in the asphaltic concrete, which was laid in a 3-inch course by Barber-Greene finishing machines. Four-foot-wide shoulders were constructed on either side of the roadway.

The Arabian American Oil Co., composed of a group of U. S. firms, is not only developing the country's petroleum resources, but is also assisting in the internal development of the country both directly and through oil-concession fees. THE END

New Book Treats Design Of Television Stations

The planning and designing of television stations is dealt with from the standpoint of both architects and engineers in a new book, "TV Stations", written by Walter J. Duschinsky and published by Reinhold Publishing Corp. The book is an addition to the Progressive Architecture Library Series.

All phases of studio and antenna tower design are treated, as well as such aspects as placement of facilities and equipment, lighting, and acoustics. Many photographs, diagrams, plans, and tables illustrate the text.

"TV Stations" is priced at $12, and may be obtained by writing the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Catalog Gives Details On Bituminous Finisher

■ Information on the Barber-Greene Model 879-A finisher is included in a catalog showing the unit at work in a wide range of applications and locations.

Simplified drawings illustrate the machine's principles of automatic leveling and thickness control, tamping compaction, and control of crown and superelevation. A cutaway photograph shows the finisher's inner mechanisms. Several accessories which can be fitted to the finisher, enabling it to perform special functions, are also shown.

To obtain this literature write to the Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill., or use the Request Card at page 18. Circle No. 21.

Portable Generators And Earth-Boring Units

■ The new line of Gen-A-Matic portable gas-engine generators is covered in a booklet from Multi-Matic Corp., 14741 Bessemer St., Van Nuys, Calif. The Gen-A-Matic generators are used by contractors for supplying instant power for the operation of portable power tools, standby lighting, charging units, and similar equipment.

The literature also describes the complete range of diggers and tunnelers now being manufactured by Multi-Matic Corp. for such jobs as soil sampling, post-hole digging, well drilling, sewer-line tunneling, and fencing.

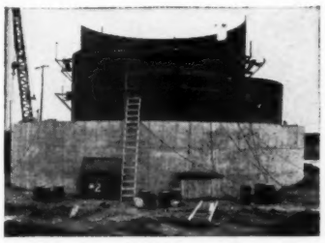
To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 16.

Prefabricated Form System Used For All Types of Construction

Saves Time . . . Labor . . . Material

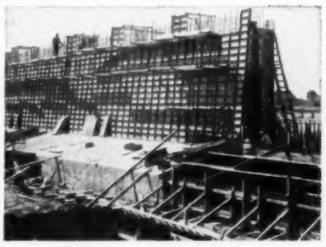
UNI-FORM Concrete forms are widely used in all types of concrete construction because they provide contractors with three important advantages: (1) Increased labor productivity — forming crews can erect more contact area per man hour; (2) Guaranteed material and labor savings and (3) Complete flexibility of application.

Simple mechanical assembly of plywood faced, steel-framed UNI-FORM Concrete Forms permits any labor force to become expert in a short time. All forming requirement — inside corners, outside corners, pilasters, one-side alignment and bracing, automatically accurate wall widths, scaffolding, etc. are engineered into, and provided with, the UNI-FORM System.



Circular wall formed with UNI-FORM Panels

Contractors using the UNI-FORM System have the basic equipment to handle any type of concrete construction. Complete engineering service . . . job analysis, forming recommendations, bills of material and forming details, together with field service are available to contractors through the manufacturer, Universal Form Clamp Co., Chicago, or through any of the company's many Distributor or Branch Offices.



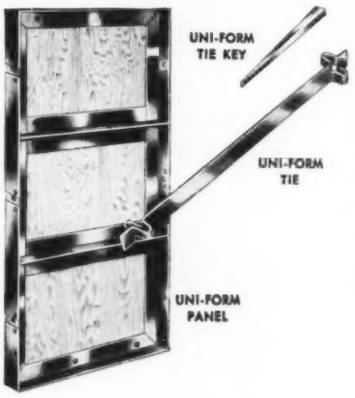
Battered wall forming with UNI-FORMS

A complete catalog, describing the UNI-FORM System of Wall Form Construction is available upon request. Write: Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago 51, Ill.

UNI-FORM Concrete Forms

SIMPLE . . . FAST . . . FLEXIBLE

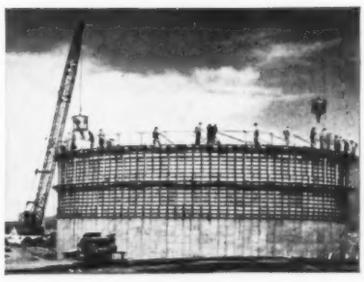
3 BASIC ELEMENTS mean Faster, Easier, More Accurate Forming



Simple mechanical assembly of UNI-FORM Concrete Forms provides faster forming . . . easier stripping and lowest all around costs. Ready to use when they reach the job, UNI-FORMS guarantee time, material and labor savings on any forming job. Let us prove UNI-FORM advantages . . . send us a set of prints for free recommendation and proposal on your next job. There's no obligation.

FORM CIRCULAR WALLS AT LOWEST COST

- **No alignment or bracing on outside.**
- **Minimum excavation required.**
- **Free working area.**
- **Maximum job safety.**



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BPR and Manufacturers Study Soil Stabilization

Soils which have so far resisted methods of stabilization may soon be treated successfully as a result of cooperative studies now being undertaken by the U. S. Bureau of Public Roads and a number of chemical concerns. The bureau is particularly interested in developing a chemical treatment which will make base courses for bituminous roads resistant to moisture effects.

The bureau's assistance to manufacturers consists of making suggestions for tests and furnishing a limited quantity of soil for test purposes. If a company's preliminary studies show that a certain chemical may prove valuable, the bureau will undertake evaluation studies of the chemical in its own laboratories. Then, if the chemical stands up under the tests of both the bureau and the manufacturing firm, the bureau will arrange for it to be used in experimental road construction with a state highway department.

The bureau and the manufacturing firm pay for their respective investigations, and the rights to patent any successful process remain with the manufacturer. To date, E. I. du Pont de Nemours, American Cyanamid, Rohm & Haas, Dow, the Tropical Agricultural Research Laboratory, and Food Machinery & Chemical Corp. are conducting investigations under an agreement with the bureau, and other companies are expected to join in the work.

Automatic Welder For Rebuilding Parts

■ A catalog on the new AMSCO Leader automatic welding machine illustrates the unit's features for rebuilding tractor parts. This equipment is designed for submerged or open-arc-weld hardfacing.

The AMSCO Leader Model 550 is delivered complete with a heavy-duty ac welder for variable heats up to 500 amps, an automatic welding head, two built-in welding positioners, a horizontal cross-arm carriage, and controls.

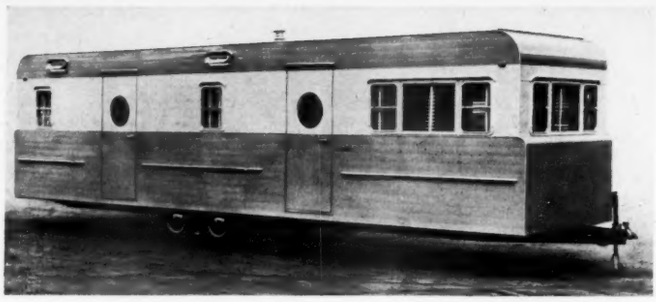
To obtain this literature write to American Manganese Steel Division, American Brake Shoe Co., 389 E. 14th St., Chicago Heights, Ill., or use the Request Card at page 18. Circle No. 8.

Truck-Mounted Derricks For Pole Handling

■ A new folder illustrates the complete series of Hall-designed hydraulic truck derricks manufactured by American Truck Equipment Co., Swan Island, Portland, Oreg. Operation-position charts and load ratings for the mobile pole-handling equipment are included.

The literature contains first published details of a new Model HT derrick with adjustable telescoping side legs that enable the operator to power-set the derrick height at any desired point from 22 to 28 feet.

To obtain Form 954 write to the company, or return Request Card at page 18. Write the manufacturer's name on the card.



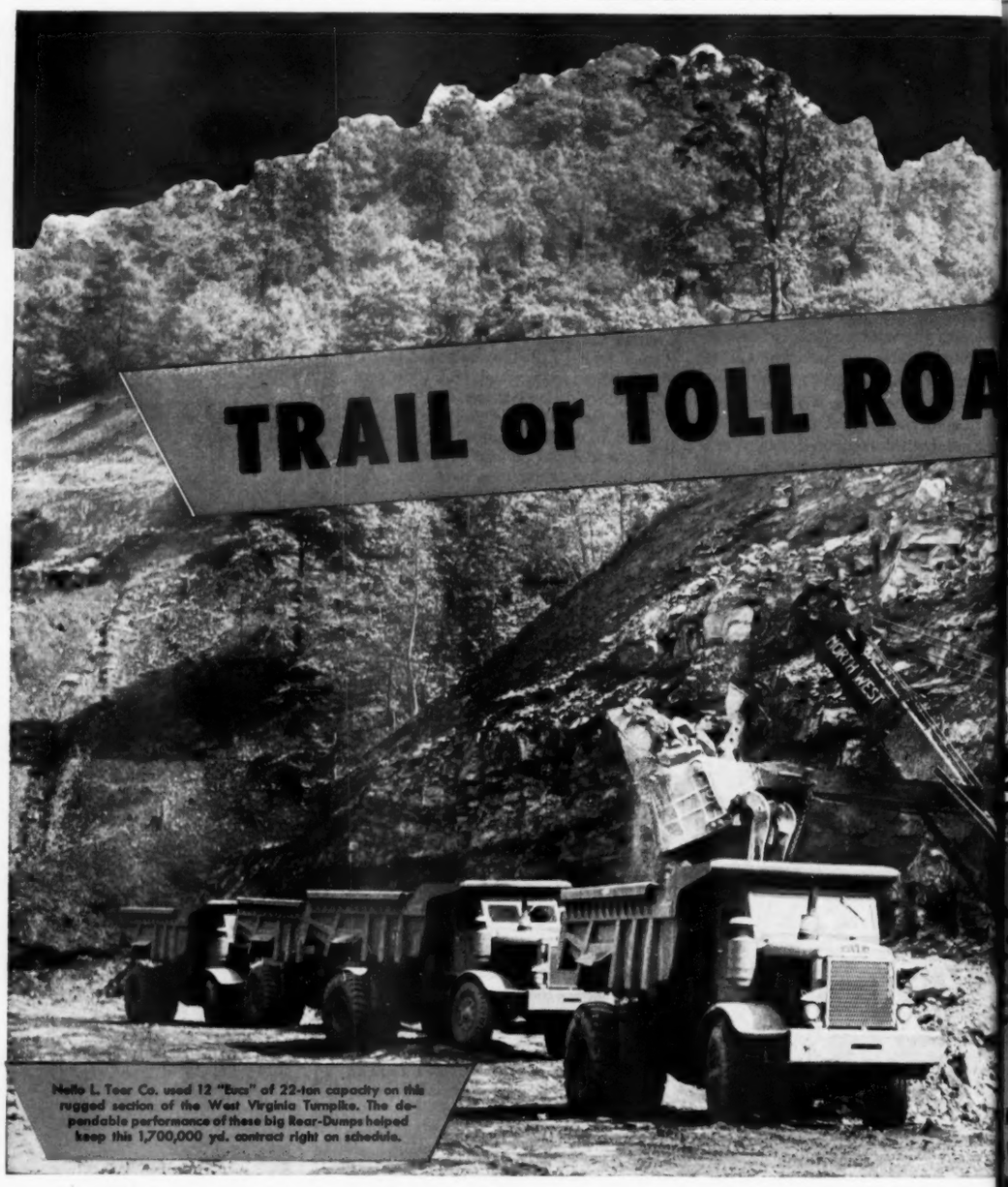
The interior of the L. B. Smith trailer can be fitted to customer's specifications for a wide variety of functions on a construction site. ►

Multipurpose Trailer For Construction Camps

■ A versatile new trailer is designed so that it can be used as a field office, parts room, portable machine shop, or a field laboratory. It can be adapted to provide dressing rooms and toilets, or can be used as a place in which to lock up tools at night.

The new trailer is called the Smithco trailer and was designed as a multipurpose unit that can be custom built to the buyer's specifications and needs.

For further information write to L. B. Smith, Inc., Camp Hill, Pa., or use the Request Card at page 18. Circle No. 25.



Nello L. Teer Co. used 12 "Eucs" of 22-ton capacity on this rugged section of the West Virginia Turnpike. The dependable performance of these big Rear-Dumps helped keep this 1,700,000 yd. contract right on schedule.

Whether the job is building a mountain trail, a farm to market road or a modern super-highway, there is a size and type of Euclid earth moving equipment to do the job fast and economically.

For example, Rear-Dump "Eucs" for hauling rock and heavy excavation range in payload capacity from 10 to 50 tons . . . Bottom-Dumps carry heaped loads of 15 to 30 cu. yds. of earth, gravel and free flowing material . . . self-powered Scrapers pick up and haul heaped loads of 9 to 21 cu. yds. (7 to 18 yds. str And for fast mobile loading of large capacity ha equipment on big yardage jobs, the Euclid Loa unequalled for low cost production.

Road contracts during the next 10 years wi awarded at a record rate. They'll go to contra with equipment that does the job faster and at l cost. Your Euclid dealer will be glad to provide ful facts and figures . . . get in touch with him

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

EUCLID THE PIONEER

Euclid Equipment

FOR MOVING EARTH ROCK COAL AND ORE

New National Plant-Mix Asphalt Body Takes Shape

A steering committee composed of representatives of seven state associations is currently preparing a constitution, bylaws, a budget, and other articles necessary for organizing a national plant-mix asphalt paving association.

Last November, approximately 40 delegates representing 14 state hot-mix associations voted to organize the national group. Sheldon G. Hayes of the Cadillac Asphalt Paving Co., Detroit, and Scott A. Baker, executive secretary of the Michigan Asphalt Paving Association, were named chairman and secretary, respectively, of the organization committee.

Purposes of the association, as stated at the November session, will be to inform and educate the public on the advantages of asphalt paving; to maintain close contact with federal agencies and to represent the industry on a national level; to improve the efficiency of asphalt construction operations; and to exchange ideas in an effort to develop and maintain high standards.

Special emphasis was put on the fact that the new organization will work in complete harmony with the Asphalt Institute, and that efforts of either group would not conflict.

Equipped to operate from a power takeoff, this Katolight generator is suitable for emergency and field use.

Tractor Power Takeoff Drives New Generators

■ A line of generators that can be easily attached and driven directly from the power takeoff of almost any tractor is available from the Katolight Corp., First Avenue at Chestnut, Mankato, Minn. The generators are equipped with properly ratioed gears, running in oil, for continuous service. They are of the revolving-field type.

Models in this line range from 5 to 25 kw in output. Stationary and trailer-mounted models are available, and instrument panels may be obtained for all sizes.

For further information write to the company, or use the Request Card at page 18. Circle No. 10.

Federal Positions Open To Engineering Draftsmen

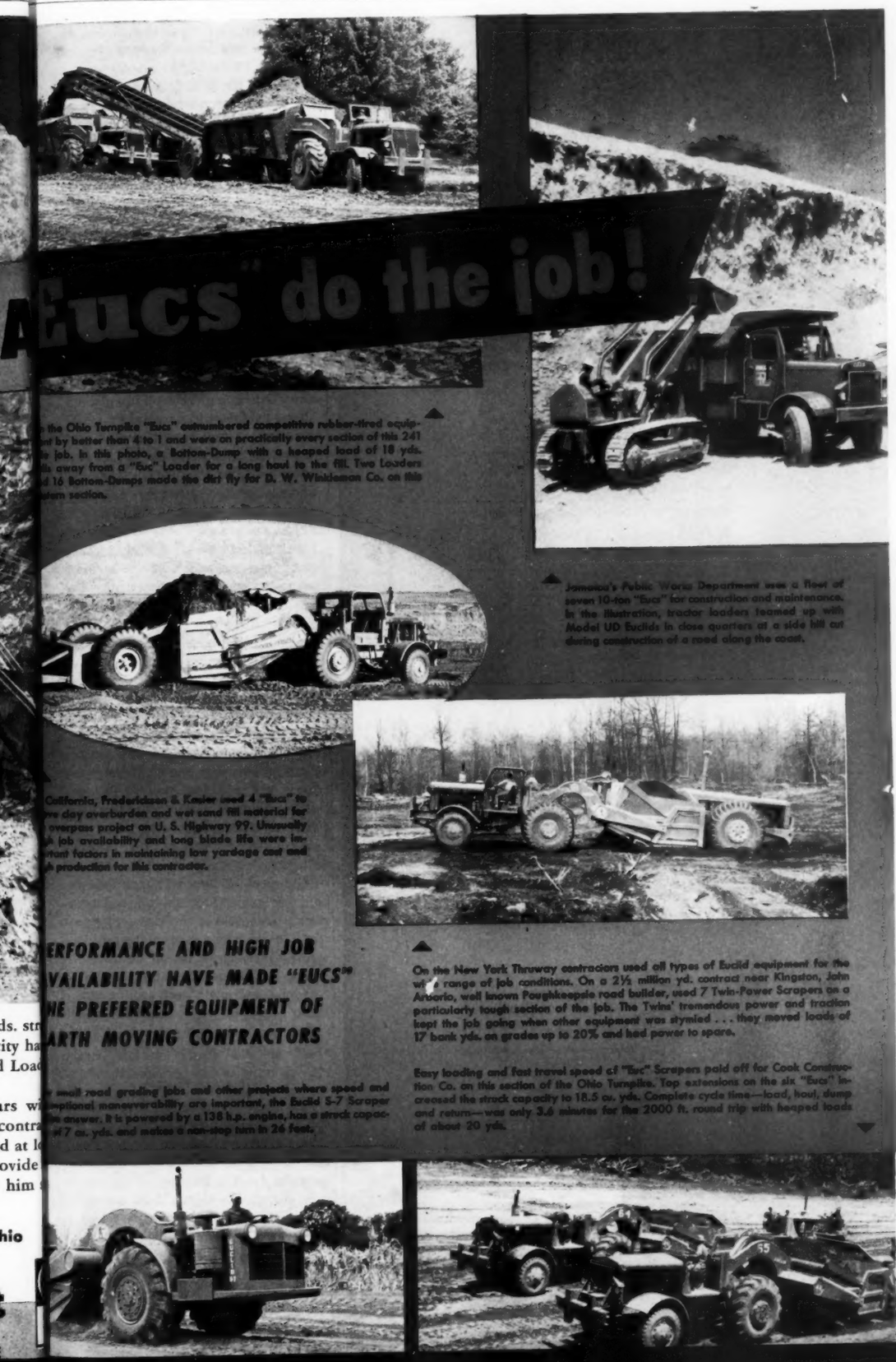
Examinations for federal service appointments as engineering draftsmen and as highway engineer trainees have been announced by the U. S. Civil Service Commission. Positions open pay from $2,750 to $5,940 a year for draftsmen, and $3,175 to $3,410, for trainees.

No written test is required for draftsmen. To qualify, applicants must have had appropriate education, experience, or both. Education above high school level and leading to a bachelor's degree with major in architecture, engineering, forestry, geology, mathematics, or physics may qualify the applicant, providing he has had at least one year of college mathematics and one year of college drafting. Students within six months of completing the required courses may apply.

Highway engineer trainee positions paying $3,175 require that applicants must have completed ¾ of the total number of credits required for a bachelor's degree in civil engineering. Those applying for $3,410 jobs must have completed a full four-year professional curriculum in civil engineering or must have had four years of professional experience in civil engineering. Students who expect to complete the required amount of academic study by September 30, 1955 may apply. A written test will be given.

Further information and application forms may be obtained from U. S. post offices throughout the country, or from the U. S. Civil Service Commission, Washington 25, D. C.

Highway engineer trainee applications should be sent to the Board of U. S. Civil Service Examiners, Bureau of Public roads, Department of Commerce, Washington 25, D. C., and must be postmarked no later than February 8.



the Ohio Turnpike "Eucs" outnumbered competitive rubber-tired equipment by better than 4 to 1 and were on practically every section of this 241 mile job. In this photo, a Bottom-Dump with a heaped load of 18 yds. is away from a "Euc" Loader for a long haul to the fill. Two Loaders and 16 Bottom-Dumps made the dirt fly for D. W. Winkleman Co. on this western section.

Jamaica's Public Works Department uses a fleet of seven 10-ton "Eucs" for construction and maintenance. In the illustration, tractor loaders teamed up with Model UD Euclids in close quarters at a side hill cut during construction of a road along the coast.

California, Frederickson & Kaiser used 4 "Eucs" to move clay overburden and wet sand fill material for an overpass project on U. S. Highway 99. Unusually high job availability and long blade life were important factors in maintaining low yardage cost and high production for this contractor.

On the New York Thruway contractors used all types of Euclid equipment for the wide range of job conditions. On a 2½ million yd. contract near Kingston, John Amorio, well known Poughkeepsie road builder, used 7 Twin-Power Scrapers on a particularly tough section of the job. The Twins' tremendous power and traction kept the job going when other equipment was stymied . . . they moved loads of 17 bank yds. on grades up to 20% and had power to spare.

For small road grading jobs and other projects where speed and exceptional maneuverability are important, the Euclid S-7 Scraper is the answer. It is powered by a 138 h.p. engine, has a struck capacity of 7 cu. yds. and makes a non-stop turn in 26 feet.

Easy loading and fast travel speed of "Euc" Scrapers paid off for Cook Construction Co. on this section of the Ohio Turnpike. Top extensions on the six "Eucs" increased the struck capacity to 18.5 cu. yds. Complete cycle time—load, haul, dump and return—was only 3.6 minutes for the 2000 ft. round trip with heaped loads of about 20 yds.

Piles for two bridges cast at central plant

TWO BRIDGES, part of a 4-mile toll project, now carry the heavily traveled Gulf Highway, U. S. 90, across the Pascagoula River in southeastern Mississippi. This mysterious "singing river" spreads out over a wide marshy valley as it nears the Gulf of Mexico, so that more than 2½ miles of tidal marshland separate the stream's two distinct channels—the East and West Pascagoula Rivers. The bridges crossing these channels cost a total of $4 million, and represent more than half the total construction cost of the facility.

Required work on the project included 2½ miles of dredge cut and backfill across the swamp. (See "Sand Fill Across Marsh Forms Roadway Grade," C&E, June, 1954, pg 80.) This, the paving of four miles of concrete road connecting with the state highway at either end, and the construction of toll-collection facilities, boost the road's construction cost to $7 million. The entire cost, including right-of-way, financing, engineering, and incidentals, in addition to the construction cost, approaches the $9 million figure. Bonds sold to finance the large project will be repaid from tolls.

The project was designed and supervised by Hazelet & Erdal, Louisville, Ky., consulting engineering firm. Texas Construction Co., Dallas, Texas, was the general contractor for the construction of both bridges. As part of the general contract, the old bridges across the channels will be removed.

Has Bascule Span

The east river bridge has a 172-foot double-leaf bascule span which provides 140 feet of horizontal clearance when open, with unlimited vertical clearance for river traffic. Maximum clearance near the center of the span with the bascule leaves closed is 32 feet, enough to permit many smaller craft to pass. At each end of the bascule are the big piers which house the operating machinery and counterweights for the movable span. The operator's house is located on the south side of the east pier.

The other spans in this bridge are arranged symmetrically about the bascule span. On each side are two steel plate-girder spans of 96 feet 10 inches and 90 feet, respectively, followed by eight reinforced-concrete girder spans of 41 feet each. Over-all length between abutments is 1,256.5 feet. Plate girder spans rest on concrete piers founded on concrete piling. Concrete girder spans are supported on concrete pile bents.

Two 26-foot-wide roadways separated by a 3-foot raised median and flanked on the outside by 5-foot sidewalks make up the deck section. A concrete barrier curb surmounted by an aluminum handrail finishes off the outer faces. Over-all width of this deck is 67 feet. A construction joint down the center of the median makes the two halves practically independent structures.

Since there is substantially less marine traffic in the west river, the second bridge has not been provided with a movable span. A minimum vertical clearance of 12 feet under the girders of the center spans permits small craft to pass under the bridge. A canal dug parallel to the new road connects the east and west rivers so that boats unable to get under the west bridge can conveniently reach the east channel.

Plate-girder spans 82, 102, and 82 feet long, respectively, at the center of the west bridge are supported on concrete piers founded on concrete piles. Concrete pile bents support the 38 reinforced-concrete girder spans which make up the remainder of the structure. This bridge is 1,824 feet long and has a deck section similar to the other, except that the sidewalks are only 3 feet wide. This makes the over-all width 63 feet.

Piles Are Precast

In setting up offices and yard near the west end of the east river structure, Texas Construction Co. selected an area of high ground on the island between the two bridges. This location, convenient to the deep channel of the east river for marine operations, was served by a spur from the Louisville & Nashville Railroad. Form-fabrication plant, equipment-repair shops, and concrete batch

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THERE'S a new standard of comparison in concrete vibrators! Five years of intensive research, engineering and job-testing by America's foremost concrete equipment manufacturer have produced these three new Whiteman models . . . built for outstanding performance and durability.
Specific vibration requirements of any size can be handled with maximum efficiency with this Whiteman "Tailored to the Job" equipment. Components are completely interchangeable.
Vibrator heads are designed and precision built to rigid Whiteman standards. 1¼" to 3" diameters. 11" to 17" lengths. Core and casing available in lengths from 10 ft. to 30 ft.
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MODEL EW
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Careful location of casting, storage, and loading facilities permits easy handling of precast concrete pier and bent members

plant were located in this yard.

Immediately adjacent to the TCC yard, a plant was set up by Gordon Walker, contractor of Lottie, La., for the manufacture of the reinforced-concrete piles for both bridges. The basic unit of this plant was a 25-ton Case electric gantry crane, operating on a 77-foot track gage. Since this machine performed practically all operations from setting the forms to loading the finished piles, the plant was laid out so that casting, storage, and loading facilities were within the gage of the crane.

Walker laid out five casting beds, each 100 feet long and wide enough to cast 23 piles side by side. Each bed consisted of a series of wood pallets 2 feet wide, spaced about 6 inches apart, and supported on a sturdy timber base. With a chamfer strip along each side, each of these pallets was the bottom form of a pile. Collapsible, double-faced, steel segments were set up between the pallets to make the side forms. Each segment formed the sides for two adjacent piles. A special form section made tapered points for the bottom end. Bulkheads were set to provide piling of any length desired, since pile lengths on the bridges varied from 45 to 96 feet.

Forms

In a typical day's operation, forms from the previous day's pour were dismantled and cleaned. The gantry then set prefabricated reinforcing cages in place on the pallets of an unused casting bed. Next the heavy metal forms were transported to the new bed and set in place by the crane. While workmen were aligning and bolting down the forms, the crane was busy loading or stockpiling piles which had cured sufficiently to be handled. Piles were moved after test cylinders indicated that the concrete had attained a strength of at least 4,000 psi. This usually required between 7 and 14 days days of curing.

Normally the forms were ready for a pour about noon. Concrete was produced in a plant consisting of a Johnson two-compartment 50-ton aggregate hopper, from which batches were discharged into a 2-yard Ransome mixer. A Koehring 304 crane and clamshell charged the bins. Bulk cement was elevated directly from cars on the adjacent siding to the weigh hopper by a job-built hoist designed by the contractor.

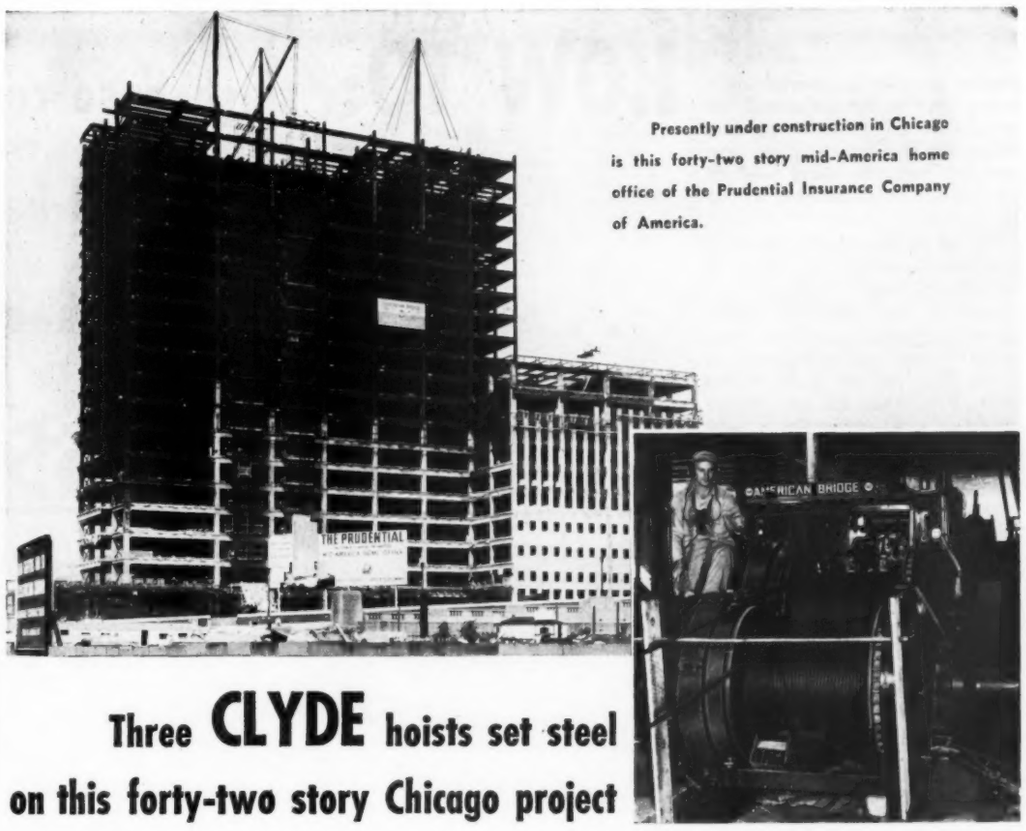
Two job-built concrete buckets were carried on a special lightweight railroad car pulled by an 8-ton Plymouth locomotive. This traveled on a track parallel to and just inside the gantry track. Three batches were dumped from the mixer into one of the buckets, and the locomotive pulled the load to the casting bed. The gantry picked off the full bucket and carried it out over the forms to make the pour, while the locomotive returned to the concrete plant with the empty bucket. Continuing this process, the crew placed about 45 cubic yards per hour. About 1,000 linear feet of piling was produced in an average day.

In the forms, the concrete was carefully vibrated with a Chicago Pneumatic vibrator supplied with air by a Le Roi compressor. Hunt Clear Cure compound was applied to the exposed top surface of the piles immediately after finishing, and to the sides after the forms were removed the next day. Hunt air-entraining agent was included in the concrete mix to produce about 4 per cent entrained air in the concrete.

When piles could be moved, they were stored between the gantry rails in an area beyond the casting beds until they were needed. Clamps

(*Continued on next page*)

In the casting yard, a Case electric gantry operates over a 77-foot-wide area, performing almost all the required operations from setting forms to loading finished piles. Piles are cast on the bed, foreground, and stored until needed.
C&E Staff Photo



Presently under construction in Chicago is this forty-two story mid-America home office of the Prudential Insurance Company of America.

Three CLYDE hoists set steel on this forty-two story Chicago project

There's a lot the illustrations do not show about this construction project

Only one of three Clyde Steel Erector's Hoists on the job is pictured. We would like to be able to boast that a dozen Clyde Hoists worked on this job, but it takes only three to keep up to schedules . . . to keep materials flowing smoothly, that's the extra value you'll find in Clyde.

Time is big money on a project of this proportion. Any down time throws a monkey wrench into schedules and costs! Ease of maintenance . . . minimum maintenance . . . may have been a deciding factor in the contractor's choice of Clyde Hoists. Or perhaps the all-steel bed and side frames that provide the necessary ruggedness without excessive weight. The selection could have been based on the large diameter brakes and internal expanding band friction clutches that engage and release smooth and positive for perfect load control. Anti-friction bearings throughout and the ease of chain adjustment without removing chain guard are more features owners and operators like in Clyde Hoists!

It takes a lot of features to add up to a superior quality, work-hungry hoist . . . one that will smoothly and swiftly spot loads with safety, without operator fatigue and without down-time! All these and many other outstanding and exclusive features of Clyde Hoists are the result of the 55 years of engineering and manufacturing know-how that goes in to every Clyde.

Before considering the purchase of any hoisting equipment, write for complete information about a "Quality-Plus" Clyde Hoist. Get all the facts and you'll get a Clyde.

HOISTS—DERRICKS—WHIRLEYS—BUILDERS TOWERS—CAR PULLERS—HANDI-CRANES—ROLLERS

CLYDE IRON WORKS, INC.
Established in 1899
DULUTH 1, MINNESOTA

ONE OF THE 16 INTEGRATED COMPANIES BARIUM STEEL CORPORATION

A 50-ton Washington revolving crane drives piling for a pier in the east channel bridge with a Vulcan OR steam hammer. *C&E Staff Photos*

gripped the piles at several points, and a steel strongback spread the load to avoid damage to the piles during handling. The very long piles not only required careful handling but also taxed the capacity of the 25-ton crane.

Beyond the storage area, the crane rails were carried out over the water on piling so that the crane could straddle a slip. Here the gantry loaded the piles on barges which were towed to the pile-driving rigs on either job. The full length of the gantry's travel was 850 feet. Walker produced 1,076 piles with a total length of more than 70,000 linear feet.

Pile Driving

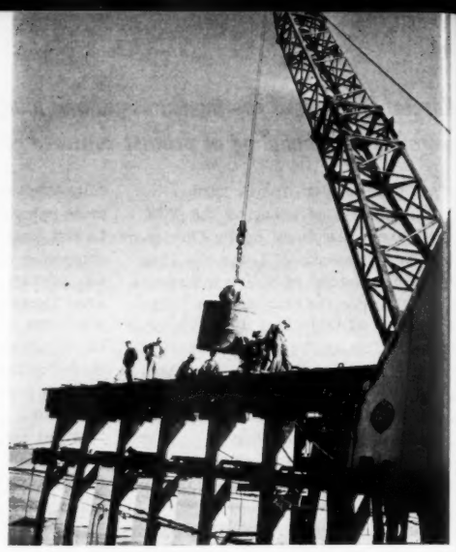
Normal pile bents consist of eight piles in a straight row, with the outer piles battered slightly. Tower bents have double that number of piles, placed in pairs and battered in the longitudinal direction of the bridge so that each pair forms an inverted V. Tower bents are used for every fifth bent of the west bridge, and adjacent to the piers of the east bridge.

Piles for bents were driven in a set of stationary leads supported by an A-frame mounted on the end of a barge. These leads could be tilted in any direction to guide the batter piles accurately. A Vulcan OR steam hammer did the driving. In the middle of the 40×140-foot barge, a 50-ton Washington revolving crane was mounted. The barge also carried a horizontal oil-fired boiler to provide steam to operate the pile driver and deck engines, and a big fire pump, remodeled for jetting, which was powered by a GM diesel engine. A 6-inch Rex pump and a 4-inch Jaeger pump for dewatering cofferdams, as well as a supply of tools and miscellaneous equipment, were also on the barge.

The big Washington crane handled the heavy piling from the barges to the leads. It was electrically operated and generated its own power with a 12-cylinder Le Roi butane-burning engine and a 150-kw generator. Since the east end of the east bridge spans a flood channel which is normally dry, the contractor dredged out a channel 120 feet wide and 190 feet long—deep enough to float the barge and permit the use of floating equipment to drive the piles.

Pier foundations were constructed inside cofferdams made of M116 steel-sheet piles driven well into the river bottom with a McKiernan-Terry 10-B3 hammer. For the bascule piers, these cofferdams measured 47 by 90 feet. Frames for bracing these large cofferdams were built up of 24-inch WF beams, and braced with 14-inch WF struts. Dewatering pumps lowered the water level about five feet inside the cofferdams while piling was being driven. After the Washington crane had set the piles in place, they were jetted to firm ground. The Vulcan OR hammer, and a follower handled by the crane, then drove the piles to final bearing so that their tops were 23 feet below water.

On the big piers, a 10-foot-deep seal of tremie-placed concrete had to be placed before the cofferdams could be



A barge-mounted P&H crane swings a bucket of concrete to the pier cap. The 24-inch-square concrete piles are lined up and held in place by timbers below the cap and by cables strung from pier to pier.

HOW TO: slash base construction costs . . . raise load-bearing standards . . . save thousands of maintenance dollars with the BIG NEW 1955 SEAMAN PU

Idaho. High densities are obtained in soil-cement construction with the SEAMAN Self-Propelled Mixer. Here the SEAMAN is mixing, blending and assembling aggregates and mixing in the water increment.

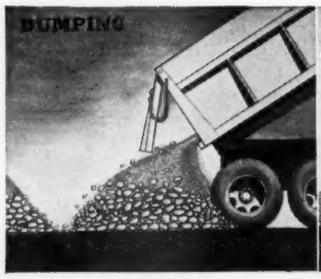
Compaction roller follows immediately behind SEAMAN TRAV-L-PLANT. The SEAMAN finishes to fine grade and crown leaving mix ready for final rolling.

In every field of stabilization, with any material, any binder . . . whether for base, sub-base, shoulder or wear course . . . the SEAMAN MIXER —

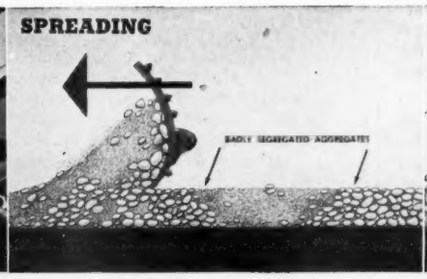
SLASHES ORIGINAL CONSTRUCTION COSTS. The PULVI-MIXER attains a thoroughly blended and proportioned mix by the proper mechanical assembly of aggregates and fines, and does it in less time at higher daily output. Consequently the square yard cost for mixing and compaction is drastically cut.

RAISES LOAD-BEARING STANDARDS. Because the PULVI-MIXER in its assembly of materials, keys and interlocks the aggregates and fills the voids with fines to securely mortar-in the larger stone, compaction produces a denser, more tightly knit course, which supports a much higher traffic load.

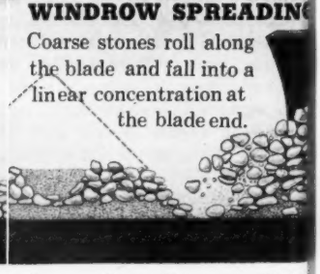
SECRET OF SEAMAN *(below)*



When gravel is dumped, it forms in piles. Larger stone falls first, the fines last. This segregated condition is highly unstable.



When those piles are leveled alternate pockets of fines and coarse are formed. A base so constructed will soon ravel and break up.



In spreading windrows to final grade fines are concentrated in the windrow "heart." Some fines remain as a pocket, others sift to the bottom. Such segregation also is very unstable.

dewatered to start construction of the forms. On smaller piers, the seal was 4½ feet deep. For these pours, 10-inch tremie pipe 34 feet long was fitted with a hopper holding about a cubic yard of concrete. Concrete was pumped from the mixer to the pier by a Pumpcrete and carried from the pipe to the tremie by a crane using Gar-Bro 2-yard buckets. Inside faces of the cofferdams were carefully washed by a jet from a 4-inch jet pump to remove all muck from the walls and to insure a tight seal of the concrete against the sheathing.

When the piers were completed, all sheet piling was pulled except that on the front faces of the bascule piers. These piles were cut off 24 feet below water level by a diver using underwater cutting equipment. As further protection for these piers, 13,800 linear feet of treated timber piling was driven in the form of fenders.

With its boom and chute removed, this Worthington-Ransome paver mixes concrete for the east channel span. Dumped into a Rex 200 double Pumpcrete, the material is carried over a catwalk and barge in a 6-inch pipeline to be discharged into buckets.

Taking advantage of the combination of rail and water transportation facilities, TCC set up a central batching plant to serve both bridges. The Heltzel plant, located at the water's edge, had a navigable channel on one side and a rail siding on the other. Bulk cement arrived in barges via the Intra-Coastal Waterway from the Ideal Cement Co. plant at Mobile, Ala. Sand and gravel aggregates were delivered by rail from the American Sand & Gravel Co., Hattiesburg, Miss.

Cement was unloaded from the barges by a Lorain crane and deposited in a conical hopper. A screw conveyor transferred it from the hopper to an elevator which discharged into a 1,000-barrel storage silo. During batching operations this same elevator delivered cement from the silo to a 250-barrel storage compartment built into the aggregate hopper. Type II cement was used throughout the structures and an air-entraining agent was added to the mix.

The same crane unloaded and stockpiled aggregates and charged the 110-ton 3-compartment aggregate bins. Batches of 37.4 cubic feet each were weighed out into batch trucks to be hauled to the 34-E pavers on each job. This plant easily supplied the demands of both bridge crews. During the pouring of the 1,250-cubic-yard tremie seals for the bascule piers, the plant was in continuous operation for 40 hours.

Concrete Is Pumped

Concrete for the east river bridge was mixed in a Ransome 34-E paver and pumped into place by a Rex 200 double Pumpcrete. The paver, with its boom and bucket removed, was set up on a timber platform. An improvised chute was arranged so the concrete discharged by gravity into the Pumpcrete hopper. An earth ramp on the skip side enabled the batch trucks to dump into the skip on the level.

Parallel to the bridge—extending from the west bank near the mixer to the west bascule pier—was a timber catwalk supported on wood piles. A 6-inch pipeline from the Pumpcrete was carried on this catwalk. Because of river traffic in the channel between the bascule piers, the pipe could not be extended across this channel. To get the concrete over to the east bascule pier, a barge was set in the channel and tied up to the west pier. The Pumpcrete line was then extended out onto this barge where it discharged into concrete buckets. From a barge on the east side of the channel, a crane with a long boom reached across the channel and swung the buckets back and forth without obstructing river traffic.

On the west river bridge, where traffic on the river was not a problem and where pours were not so large, another system was used. A Multi-Foote 34-E paver was set up on the bank of the river so that its boom extended out over the water. A small barge carrying a 1½-yard concrete bucket was pulled in under the mixer boom to load the bucket. The barge was then pulled out to the point where the concrete was being poured.

At this location a large barge carrying a P&H Model 655A crane was securely anchored. A small power

with 51 improvements!

The SEAMAN Self-Propelled TRAV-L-PLANT. 7 ft. mixing width. Gasoline or diesel powered. Equipped with pump, tachometer assemblies, volumetric meter and spray bar for application of bitumens or water.

PULVI-MIXER

SAVES MAINTENANCE DOLLARS. Stones or aggregates of any size when mortar-locked by the SEAMAN-process are highly immovable, consequently resist moisture penetration and the ensuing damaging effect of traffic. This is true whether the course be simple gravel stabilization or of a higher type employing any of the many available binders. A SEAMAN constructed base or sub-base stands without spring break-up, without raveling, washboarding or maintenance requirement.

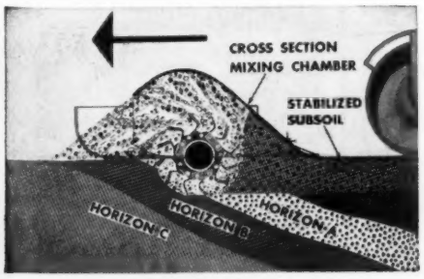
EARTH FILLS AND EARTH DAMS. Those same SEAMAN principles, — the elimination of voids, and the blending of soils produce densities in earthwork that range 95% to 100%. Very important is the inter-mixing of the various soil types found in fill material so that uniform reaction to moisture and compaction will result.

SEAMAN TRAV-L-PLANT in bituminous city street construction.

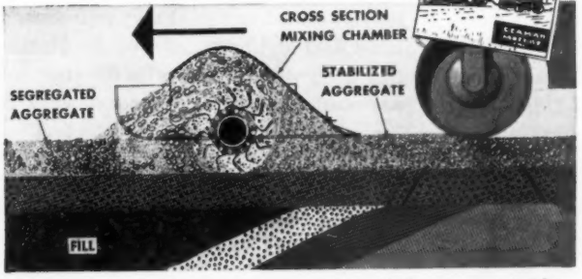
SEAMAN MOTORS, Inc.
282 N. 25th St. • MILWAUKEE 3, WIS.

A description of the SEAMAN MIXER and the work it does is detailed in this recent BULLETIN. A postcard request will bring it to you — rush. Just ask for Bulletin TPS.

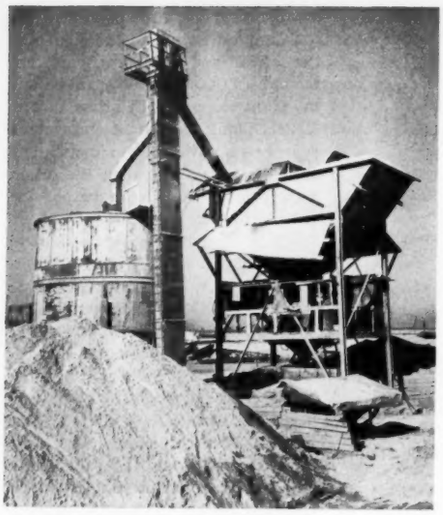
MIX STABILITY



Here the PULVI-MIXER stabilizes sub-base by blending soil horizons (A, B, C) to attain uniformity in moisture, density and thickness. This prevents sub-base failure.



Here the SEAMAN processes aggregate for the base, correcting by proper assembly of materials, an always-present segregated condition. The coarse material is keyed and interlocked, voids are filled with fines to securely mortar-in the larger aggregates.



A Heltzel batch plant, centrally located, supplies concrete to both bridges. The 1,000-barrel cement silo, left, has an elevator leading to the 250-barrel cement compartment which is built into the 110-ton-capacity aggregate bin.
C&E Staff Photos

winch on this barge pulled the concrete barge out from shore, and another winch on shore pulled it back. The crane put an empty bucket on the barge and picked off a full one. While this concrete was being placed, the barge returned to the mixer to get the empty bucket refilled. A Jaeger compressor on the barge with the crane supplied air for vibrators and other tools.

Use Steel Forms

Caps for the pile bents as well as all of the concrete girder deck spans were cast in Blaw-Knox steel forms originally manufactured for the Bay St. Louis bridge about 45 miles west of Pascagoula on the same highway. On that bridge, the deck sections were precast with the forms resting on the ground, and the precast sections were set in place on the pier caps. On the Pascagoula River bridges, the forms were modified and the deck sections were poured in place.

An ingenious system made it convenient to place and to remove the 30-ton section which formed one half of the deck for a 41-foot span. With this system it was possible to strip, move, and place the form, to set the reinforcing steel, place the concrete, and cure for seven days—all on a ten-day cycle.

After the pile caps had been poured and cured, three Beebe hand hoists were attached securely to piles of the bents located at each end of the span to be placed. A yoke made of two short pieces of 8-inch channel was placed over the pier above each winch, and the cables from the winches were run up over the pier cap on sheaves supported between the two channels. Threaded rods 1¼ inches in diameter extended down on each side to well below the bottom of the pier caps.

A barge floated the form into place between the piers, and the six cables were attached to the underside. The winches were cranked up, and the form was lifted straight up into position. Then another and longer pair of channels was placed under the cap so that its ends engaged the bottom of the form falsework, and these channels were drawn up tightly against the bottom of the pile caps by the threaded rods. As the nuts were tightened, the strain was released from the cables and taken by the rods. The winches were not needed again until the process was reversed to remove the forms after the concrete had been placed and cured.

The concrete girder sections for each bridge are all identical. The eight girders are 3 feet 6 inches deep, 19 inches wide, and are spaced 8 feet apart. A 7½-inch roadway slab spans between the girders. Sidewalks are cantilevered out from the outer girder.

One half of this section was poured at a time. Alternate spans were poured first, and after the concrete had cured, the forms were moved ahead to fill in the spaces.

As soon as top surfaces were finished, they were coated with Hunt Clear Cure compound. Sides and ends were coated with the compound when forms were removed on the second or third day. After the forms were removed, all exposed faces above water level were hand rubbed to provide a uniform finish.

Structural steel for the long girder spans and the bascules was furnished, fabricated, and erected by Nashville Bridge Co., Nashville, Tenn. Two of the long plate-girders support each half of the deck, one approximately under the curb and the other near the median. Floor beams between these girders are 33-inch WF rolled sections spaced 32 feet apart. Eighteen-inch WF stringers span between the floor beams parallel to the girders to support the concrete deck. On the girder spans, the deck consists of 8½ inches of reinforced concrete. The bascule spans have a steel-grid floor.

Personnel

Manager of the project for Texas Construction Co. was W. E. Bishop. He was assisted by W. S. Goldman, construction engineer, and C. L. Cos-

"Bought Etnyres because they are best..."

Now operating a fleet of three Etnyres, Detroit Concrete Products Corporation of Detroit, Michigan finds the units living up to expectations.

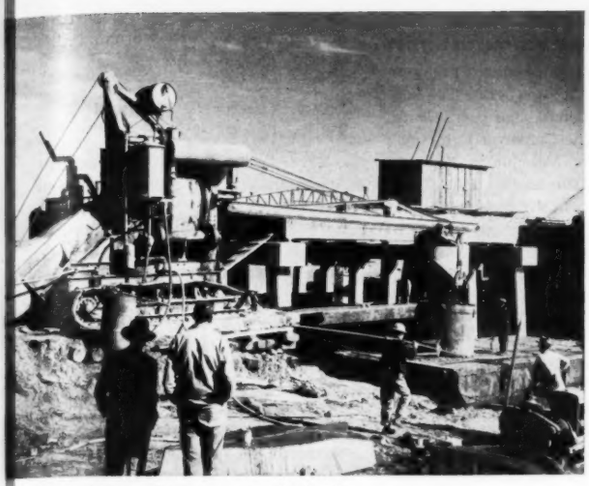
The "Black-Toppers" are easy to load, easy to drain. Bituminous material heats fast. The motor starts easily. Material is evenly distributed. Time and labor costs are reduced.

Three Etnyres are now in use—a 1000-gallon unit for standby jobs, a 2750-gallon unit purchased in 1951, and another 2750-gallon unit purchased in 1952. The "Black-Toppers" are used for work on secondary roads in the county, laying dust on city streets, and special jobs such as surfacing the 60-acre parking lot shown above.

As Mr. Paul H. Thoresen, secretary of the company, says: "We wouldn't have bought Etnyres if we didn't think they were best." Get latest data and prices now on the distributor that gives you greatest value for your dollar. See your nearby Etnyre dealer or write E. D. Etnyre & Co., Oregon, Illinois, U. S. A.

SEE YOUR ETNYRE DEALER

ETNYRE
"Black-Topper"
BITUMINOUS DISTRIBUTORS



A MultiFoote 34-E paver on the bank of the river mixes concrete for the west channel bridge. The boom of the paver extends over the water so that concrete can be loaded into 1½-yard buckets on a barge.

minsky, office manager. Superintendent for the west bridge was R. M. Bowden, and superintendent for the east structure was J. J. O'Hearn. C. S. Hill serves as resident engineer for Hazelet & Erdal, consulting engineering firm who represented the Mississippi State Highway Department. R. A. Harris is chief engineer of the department. THE END

New Book Treats Methods, Materials of Architecture

A collection of articles dealing with problems arising in the every-day practice of structural design and construction, as well as with modern developments and future trends, is presented in "Materials and Methods in Architecture", published by Reinhold Publishing Corp., New York, N. Y. The work was compiled and edited by Burton H. Holmes, technical editor of *Progressive Architecture*, from which the articles are reprinted.

Such new developments as the use of aluminum panels as building facing, of reinforced and prestressed concrete in varied forms, and of wood, steel, and plastic in numerous construction operations are discussed. At the same time, the constant problems of foundations and other construction features are treated. Photographs and drawings illustrate the text.

"Materials and Methods in Construction" is priced at $10, and may be ordered from Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

ASTM Releases New Book on Standards

A new edition of "ASTM Standards on Bituminous Materials for Highway Construction, Waterproofing, and Roofing (With Related Information)" is available from the American Society for Testing Materials.

The book contains 110 standards, including 62 test methods, 42 specifications, and 2 recommended practices.

Test methods and specifications cover: highway construction materials; waterproofing and roofing materials such as asphalts, coal-tar pitch, fabrics, felts, shingles, and creosote; viscosity by means of the Saybolt Viscosimeter; and volume correction tables.

Copies of this 436-page book may be obtained from the headquarters of the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., for $4.

Use of End-Welded Studs For Many Fastening Jobs

■ A handy wall chart tells how end-welded studs of many shapes and sizes are used for various fastening jobs in construction. The chart is illustrated with cutaway and line drawings of typical construction applications of studs. It also shows the equipment used to weld studs to steel in a split-second. Dimensions of the most commonly used construction studs are also listed.

To obtain this literature write to the Nelson Stud Welding Division of Gregory Industries, Inc., Lorain, Ohio, or use the Request Card at page 18. Circle No. 1.

This "No Contact" feature

REDUCES UP KEEP

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SAVES YOU MONEY

In a Hayward, there's no contact between the closing mechanism and the material handled. This "no contact" feature is a very important one to you—since it means much less wear, reduced upkeep, and a significant dollar-saving in bucket maintenance.

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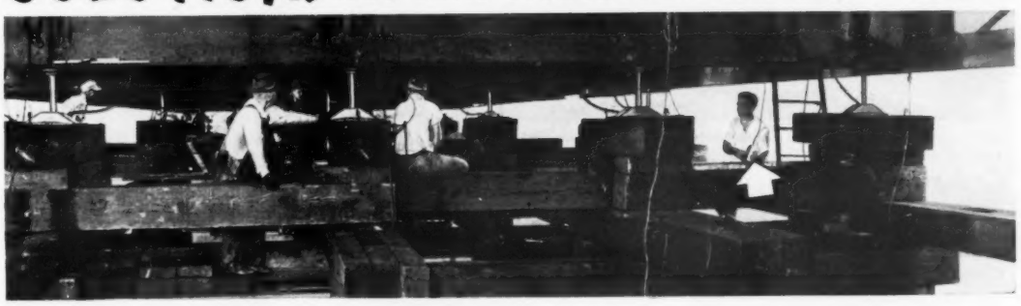
GRAB SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES
famous for performance since 1888

PROBLEM: RAISE A BRIDGE 20 FEET . . .

When this photograph was taken the jacks were suspended (in their supporting blocks) from the bridge deck while the cribbing was raised to the next jacking level.

SOLUTION: RODGERS HYDRAULIC JACKING UNITS!



It isn't often that you have to raise a bridge, but when you do, you'll discover why versatile, powerful Rodgers Hydraulic Jacking Cylinders and Pumps were selected by the Engineering Department, City of Minneapolis, as the safest, quickest and lowest cost method for raising two bridges spanning the Mississippi River. Both structures were raised twenty feet as part of the development of the upper river harbor.

One bridge, consisting of four 200 foot spans and the other, consisting of six 156 foot spans, were raised by lifting one span at a time. To do the job, twenty 50 ton jacking cylinders were placed on cribbing—10 at each end of the span to be raised. An electrically powered hydraulic pump operated the group of ten cylinders at each end. A 13 inch ram travel on the jacks produced completed lifts of an average of 5 feet per 8 hour day, including all cribbing and staying assemblies.

Remote, push button controls permitted the pump operator to go under the bridge where he could watch each lift first hand. The individual pumping source at each end assured absolutely equal lifting force at every jacking point.

Rodgers Hydraulic Jacking Units with hand or powered pumps can be used wherever needed to PUSH, LIFT or PULL. Available in capacities from 50 to 600 tons with standard ram travels from 6 to 48 inches. Ram travels to 72 inches available on special order. Rodgers engineering department will be glad to assist you in the selection of the exact jacking units required for your particular lifting, pulling or pushing job—large or small.

FREE—Complete report on the jacking phase of the bridge raising job described above—written for you by the engineer-in-charge! Ask for Bulletin 327. You'll also want Rodgers free Bulletin 317A. It contains a complete description of Rodgers Hydraulic jacking units, quick couplers, valves and hoses, and a description of hydraulic equipment used in the construction of tunnel shields.

HYDRAULICS Rodgers

Rodgers Hydraulic Inc.

7415 WALKER STREET • MINNEAPOLIS 16, MINN.

"Feel the earth tremble? Must be some big machinery working near here."

Webb Is Elected Head Of Conveyor Manufacturers

Jervis C. Webb, president and general manager of the Jervis B. Webb Co., Detroit, Mich., has been elected president of the Conveyor Equipment Manufacturers Association. He succeeds R. F. Tomlinson. Along with his other duties, Mr. Webb will serve as chairman of a policy committee dealing with long-range planning for the association.

Other officers elected at the 21st annual meeting at White Sulphur Springs, W. Va., are Fred S. Wells, vice president; E. E. Boberg, treasurer; and R. B. Maas, secretary. R. C. Sollenberger, re-elected executive vice president, will also be chief staff executive at the association's Washington, D. C., headquarters.

American Welding Society Elects J. H. Humberstone

The new president of the American Welding Society is Joseph H. Humberstone, president of Air Reduction Sales Co., Inc., New York, N. Y. He was elected, together with other officers and directors, at the 35th annual meeting late last year. As head of AWS, an organization numbering 9,800 members, he will direct its many activities devoted to advancing the science and art of welding.

Also elected were J. J. Chyle, A. O. Smith Corp., Milwaukee, Wis., first vice president; and C. P. Sander, Consolidated Western Steel Division of United States Steel, Vernon, Calif., second vice president.

Ford, Kennedy Named To Major PCA Offices

Elections by the Portland Cement Association at its annual meeting in Chicago resulted in Emory M. Ford, Detroit, Mich., being named chairman of the board of directors and G. Donald Kennedy, Chicago, being selected as president. They succeed R. A. Hummel and Carl D. Franks, respectively.

Two new directors also were named during the elections for the ensuing year. They are H. B. Robeson, president of the Nazareth Cement Co., Nazareth, Pa., and James H. Ackerman, president of the Dragon Cement Co. Inc., New York, N. Y.

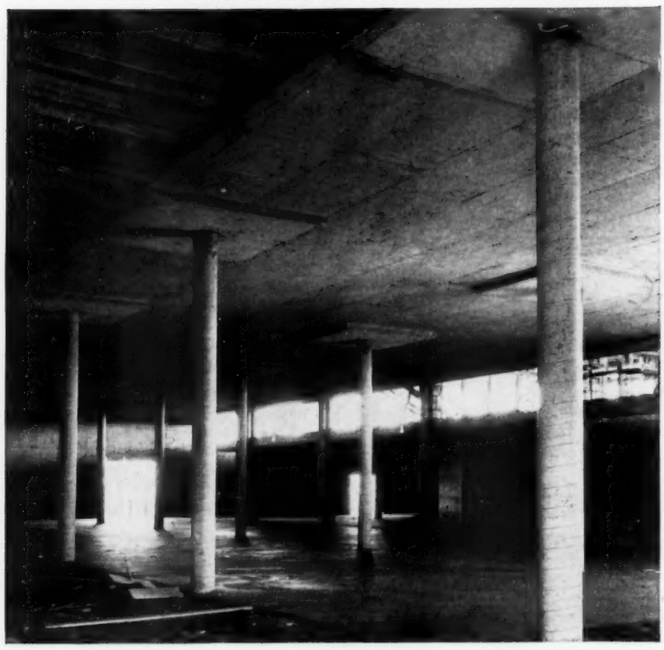
Mr. Ford, chairman of the Huron Portland Cement Co., Detroit, has been a member of the PCA board for the last 11 years and a member of the executive committee for the last year. He is a director of several manufacturing and business concerns.

Before joining the PCA in 1950 as consulting engineer and assistant to the president, Mr. Kennedy had spent more than 24 years in the fields of structural, municipal, and highway engineering.

The retiring president, Mr. Franks, leaves office after 38 years with the PCA. He has been president for the last 18 months.

Sonotube® FIBRE FORMS

for round columns of concrete



Southern Rwy. warehouse, Jacksonville, Fla. Wesley and Co., Contractors and Engineers

Columns like this save man-hours!

...low cost SONOTUBES make it possible

Forms for the round concrete columns of this warehouse were erected quicker and saved many man-hours on the job. Low cost SONOTUBES of 13.5" I.D., 17' in height were used.

Whatever the structure, for a fast, economical method of forming round columns of concrete, use SONOTUBE Fibre Forms and save time, money and labor!

SONOTUBES are lightweight and easy to handle . . . require minimum bracing. Approved by architects and engineers, widely used by contractors everywhere.

In 31 sizes, from 1" to 36" I.D. up to 50' long. Can be ordered in specified lengths or sawed to your requirements on the job.

DENFORM reusable capital form designed for use with **SONOTUBES.** Write for details

See our catalog in Sweet's

For complete technical data and prices, write

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Construction Products Division
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Specify the precast
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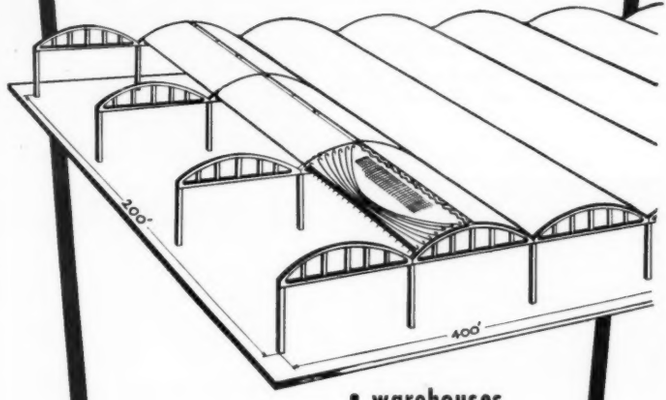

- warehouses
- factories
- low cost housing

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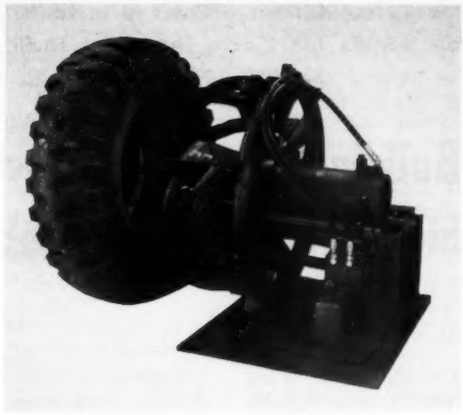
4210 Sansom Street • Philadelphia 4, Pa.



This Model A Presto unit demounts tires with up to 29-inch-diameter wheels.

Hydraulic Demounters For Rubber Tires

■ A hydraulically-operated tire demounter for 15 to 29-inch-diameter rims and wheels is made by Lee Engineering Co., Pawtucket, R. I. The Model A Presto unit demounts tires in either a vertical or horizontal position.

Power is provided by a 3-hp motor that drives a high-pressure hydraulic pump to actuate the lifting cylinder. Maximum pressure available is 33 tons.

For further information write to the company, or return the Request Card at page 18. Write manufacturer's name on card.

Rotary Liquid Pumps

■ An extensive line of rotary liquid pumps for handling all grades of bituminous liquid is illustrated in a bulletin from the Kinney Mfg. Division, New York Air Brake Co., 3529 Washington St., Boston 30, Mass. The literature gives details of a rotary plunger pump for metering and general transfer service. Also illustrated is a rotary gear pump with external bearings and timing gears.

Comprehensive details on the pumps' characteristics are provided. Cutaway views illustrate the component parts of the various models.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 17.

Catalog on Equipment For Welding and Cutting

■ A comprehensive line of apparatus for welding and cutting is covered in a catalog from the K-G Equipment Co., Inc., Box 538, Allentown, Pa.

Equipment described includes cutting torches and tips, welding torches and attachments, and welding and heating tips.

To obtain Catalog 54E write to the company or return the Request Card at page 18. Write manufacturer's name on card.

New Dravo Appointment

Effective last month, Richard Lee Quasey is assistant purchasing agent of the Dravo Corp., Pittsburgh, Pa. Joining Dravo in 1946, Mr. Quasey served as an engineer with the contracting division until he was named a buyer for the division in 1952. He holds a degree in civil engineering from Cornell University.

Engineering Trustees Re-elect J. L. Head

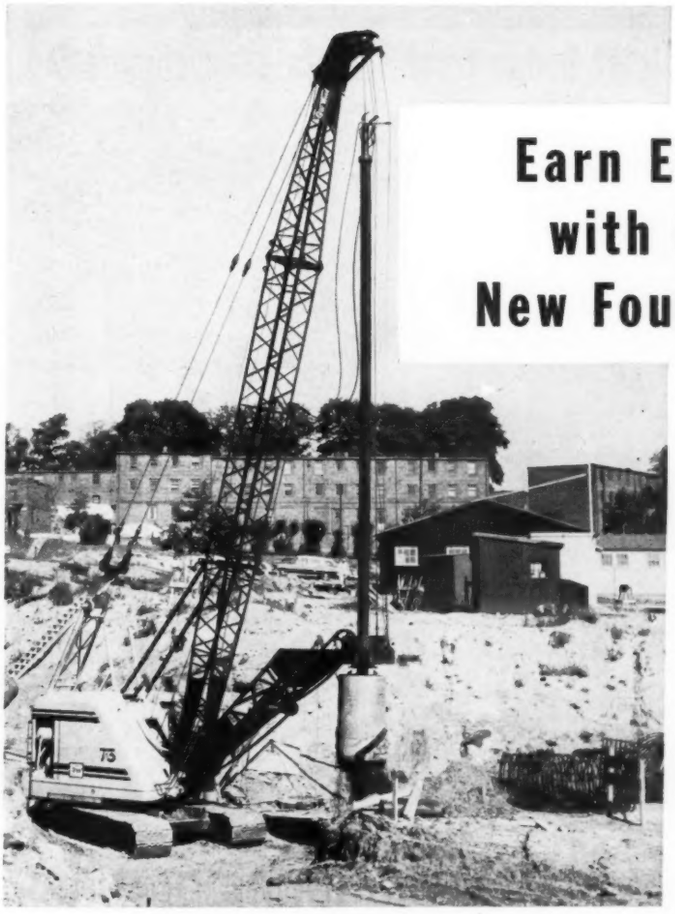
At its 51st annual meeting, United Engineering Trustees, Inc., re-elected James L. Head president of the organization. A mining engineer, he is with the Anaconda Copper Mining Co.

The trustees own and control extensive gift funds for engineering and scientific research, as well as one of the leading free public engineering libraries in the United States. The group includes 12 men, each founder society (representing the fundamental branches of engineering,) appointing three members as representatives.

Others elected with Mr. Head are: W. J. Barrett and W. F. Thompson, vice presidents; Waldo G. Bowman, treasurer; Joseph L. Kopf, assistant treasurer; and John H. R. Arms, secretary.

Curtiss Heads BPR Office

C. D. Curtiss this month becomes U. S. Commissioner of Public Roads, succeeding Francis C. duPont. Mr. duPont is resigning his post with the Bureau of Public Roads to become a special assistant to Secretary of Commerce Sinclair Weeks.



Earn Extra Profits with Gar Wood's New Foundation Borer

Foundation Borer mounted on Gar Wood 75B crane.

Gar Wood's exclusive factory installed foundation borer attachment is completely convertible . . . Shown above mounted on a Gar Wood model 75B crane, it can be just as easily used with the 75BT truck crane or the standard 75A crane.

It can be utilized on a wide variety of applications including foundations, piers, caissons, piles, footers, ballast holes, buried tanks, wells, wall supports, soil borings, septic tanks, strata samplings, dikes and shores, and harbor and river improvements.

All four basic types of borings—straight flat, caissoned, bell bottom and multiple taper—can be quickly and easily handled without adjustments.

The cutting edges and belling vanes are hydraulically operated while bucket is driven by a positive chain drive . . . Only Gar Wood offers this new, profit making attachment—the only heavy-duty tool available for constructing the new unreinforced foundation footings.

The Gar Wood line of excavators includes both standard and heavy-duty cranes, shovels, trench hoes, clamshells, pile drivers and magnets with a heavy-duty truck crane also available.

Gar Wood also manufactures a complete line of bulldozers with both hydraulic and cable operation for every model of A-C tractors. Also the famous line of Buckeye ditchers, spreaders and finegraders.

Buckley & Co., Inc., Philadelphia contractors, are using a new Gar Wood foundation borer attachment to make unusually rapid progress on a contract to dig 397 footings for the new Eastern Pennsylvania Psychiatric Institute.

Jack Buckley, Jr., superintendent on the job, says, "This new machine is getting the job done 8 to 10 times faster than we've been able to do before. The independent controls make the machine extremely maneuverable and it certainly meets our needs for a fast, smooth-operating borer."

Working on a sub-contract from Turner Construction Co., the Buckley organization is boring down as deep as 55 ft. with the holes from 36 to 54 inches in diameter.

A regular Gar Wood model 75B crane with 85 ft. boom is fitted with the foundation boring attachment using a 70 ft. stem. Operating speed has averaged about 1 ft. per minute.

Close-up shows the smooth cut possible with a Gar Wood foundation boring attachment . . . When maximum desired depth is reached, vanes on bucket can be opened to bell out the bottom of the hole to a maximum diameter of 90 inches . . . This feature allows the hole boring and belling to be combined into one easy production line operation . . . Bucket is placed in operation with a rotating motion to load. When full it is lifted out of hole, vanes on bucket are opened to permit dumping. The entire operating cycle is completely mechanical.

GAR WOOD INDUSTRIES, INC.

Executive offices, Wayne, Michigan

Construction Equipment: Excavators, Dozers, Ditchers, Scrapers, Spreaders, Finegraders. *Truck Equipment:* Dump Truck Bodies & Hoists, Winches & Cranes.

GAR WOOD GW INDUSTRIES

F 4005 N

Contractor places foundations without forms, tilts up concrete wall panels for 7-acre industrial facility

Building methods effect big saving on plant job

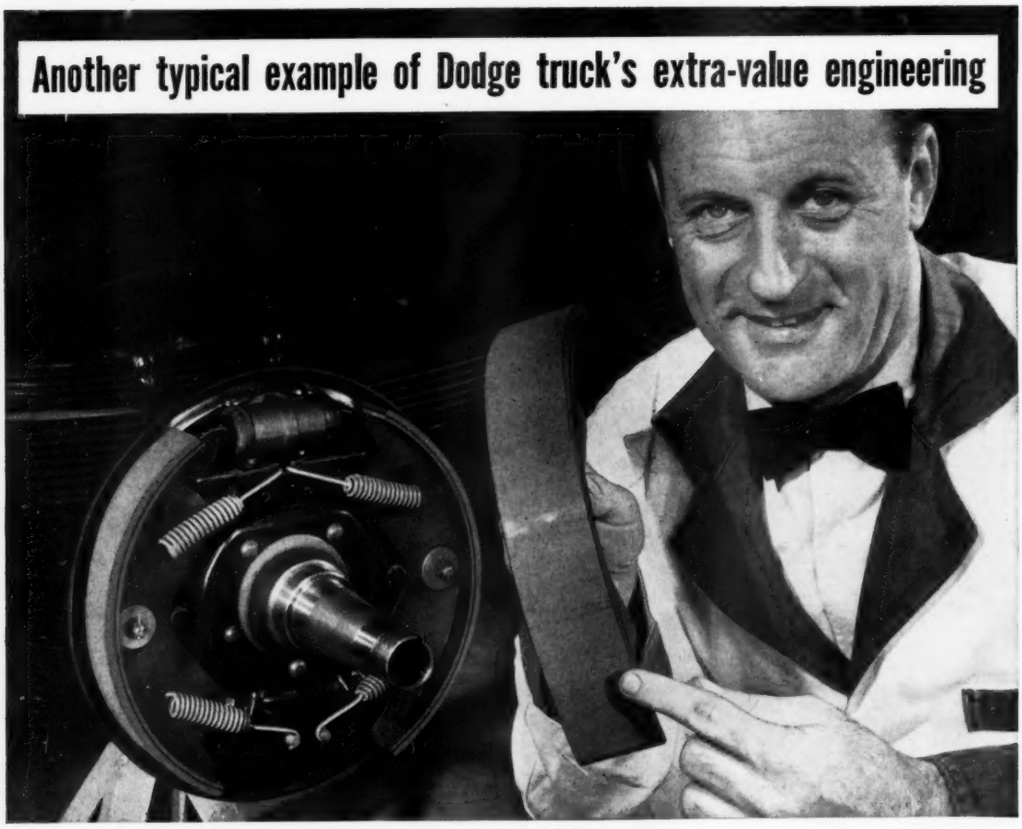
A job-adapted Tournacrane sets a precast concrete panel in position as the exterior wall takes shape on the Westinghouse plant. Panels were cast on a small section of the floor slab and moved to position by the Tournacrane.

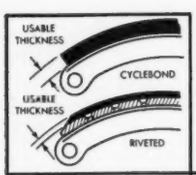
Simplicity of design and the use of such money-saving methods as tilt-up construction are the noteworthy features of the new lighting fixture plant recently built for the Westinghouse Electric Corp. near Vicksburg, Miss. Architect-engineers for the job were Kaiser Engineers, Oakland, Calif. The Henry J. Kaiser Co., also of Oakland, was the contractor.

The plant is situated on a 55-acre tract 6 miles south of Vicksburg on U. S. 61. It is essentially a one-story steel frame building, 25 feet high, with a concrete floor slab and a flat built-up roof. The building, 360 feet wide and 833 feet long, contains receiving, manufacturing, and shipping areas. A general office and cafeteria wing 40 feet wide, 320 feet long, and 15 feet high adjoins the front of the main plant. A volatile storage wing 40 feet wide and 160 feet long is located along the back. Adjacent to the building is a 196-car parking lot. The plant is served by two spurs of the Illinois Central Railroad.

Savings in cost were initiated in the early stages of design when soil investigations were conducted to determine the most economical foundation. A survey showed a difference in elevation of 9 feet between opposite corners of the plant. This meant that considerable fill had to be placed in order to raise the plant floor the

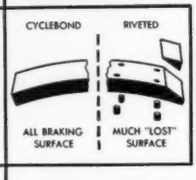
Another typical example of Dodge truck's extra-value engineering

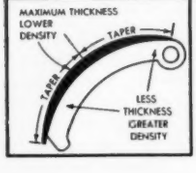




More usable thickness. Dodge truck Cyclebond brake linings can be used virtually through their full thickness. This gives the linings many thousands of miles of added life. Riveted linings should be worn only to rivet heads.

More usable surface. Every square inch of Cyclebond lining area is braking surface. Riveted linings, because of rivet holes and mitered ends, have up to 10% less braking surface.





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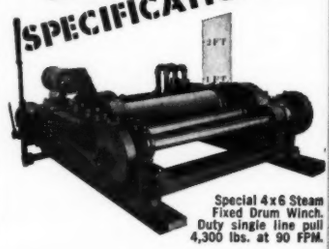

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necessary 4 feet above the outside yard level. This floor level, in turn, allowed minimum grading for the ground level spur tracks and truck docks.

From studies made of the soil characteristics on the site, it was determined that the soil, if properly compacted, would be as suitable for the foundation material as the original ground. Further, the ability of the soil to stand vertically in cuts eliminated the need for forms for the concrete pours.

It was decided to place the fill required for the building first, and then to construct the footings and other foundations on top of this fill. Pedestal-type concrete foundations were used for the building perimeter and slab foundations for the interior columns. This procedure, for all its simplicity, is quite contrary to the method generally employed, in which footings and foundations are constructed on original ground and all fill required to support the floor slabs is placed later.

Tilt-Up Method Used

Four different methods of constructing the building were compared to determine the fastest and most economical type. Since the building is basically a rectangle with very few offsets, tilt-up concrete exterior walls were finally decided on. Although this method of construction is well developed, several engineering problems presented themselves in this application.

With the plant floor about four feet higher than the ground outside the building, the lower portion of the exterior walls acts as a retaining wall for the fill under the floor slab. The design of the precast slabs was modified for this additional load.

Normal tilt-up construction, with wall slabs cast flat on the floor opposite their place in the wall, was not feasible; lack of information relative to equipment foundations, underfloor piping, and drains prevented pouring the floor slab in its usual sequence. A unique alternate plan was then devised in which a portion of the floor slab was poured and used as a casting yard for the wall panels. All wall slabs were cast in this one area and moved to position in the wall. Curing time was 21 days.

To save the expense of the two cranes and hauling equipment that normally would have been required, a single Tournacrane was adapted for this work by fitting it with special job-fabricated accessories. In a matter of minutes, this Tournacrane could pick up a slab at the casting yard, transport it to its proper place in the exterior wall, and place the panel in position.

Considerable time was saved in setting the slabs through the use of preset steel positioning plates. Plates with holes were aligned and grouted in the footings, while a matching set of plates with lugs was cast into the bottom of the panels. Alignment of each panel was no more difficult than dropping the lugs into the matching holes. Once the panel was set and braced, the Tournacrane was released for another trip. Through this procedure, a net savings of 1/5 to ¼ the cost of a comparable conventional wall was achieved at no sacrifice to appearance or utility.

Banded window design was accomplished through the use of 5-foot-high continuous steel sash placed above the built-up wall around the building. This sash is hinged at the top and operated in 160-foot sections.

The bay spacings within the plant were set at a uniform 40 × 40 feet. In order to provide flexibility of equipment arrangement, it was decided to use the same clearance under the roof throughout. This uniformity of spacing and ceiling height reduced the cost of steel in fabrication and erection time.

Roof Construction

A dead flat roof was placed over the building without any pitch whatsoever. It is designed to allow rainwater to accumulate to a depth of 2½ inches in an extremely heavy downpour before it is carried off by the downspouts.

Seven different types of roof deck were investigated, including steel, wood, and poured gypsum. The steel roof deck surmounted by one inch of fiberboard insulation and a 4-ply built-up coat-tar composition roof was finally selected as the best and most economical type, considering such pertinent factors as first cost, maintenance, heat loss, and fire resistance.

Design for future expansion was incorporated by siting the building in one corner of the tract, by uniform bay spacing, and by a level roof which permits the re-use of original drawings.

The simple functional design, p'us the latest construction methods, have resulted in a plant suitable in every way for its intended purpose. These factors, along with the ingenuity of the contractor in time and equipment-saving methods, have provided Westinghouse Electric Corp. with a building at a very low cost per square foot.

D. A. Daly was project engineer for Kaiser Engineers and Burr Tupper was superintendent for the contractor.

THE END

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Reinforced Rubber Slabs Form Railroad Crossing

What is reported to be the world's first rubber railroad crossing has been installed on the main track of the Erie Railroad at Wilbreth Road in Akron, Ohio. And engineers predict the device will eliminate one of the major irritations to motorists besides greatly reducing railroad maintenance expense.

Built with materials supplied by the Goodyear Tire & Rubber Co., Akron, the rubber vehicular roadway is made of slabs of rubber measuring 36 inches wide and 59 inches long. They are a little more than 3 inches thick, including a sheet of heavy-gage steel sandwiched within each slab. The rubber roadway rests on heavy treated wood planking laid on top of each railroad tie. The slabs are fastened down by lag screws 12 inches long.

The rubber slabs are designed with tapered flanges where they meet the rails. When sprung into place, the flanges form a watertight wedge against the rail, thus preventing seepage which causes deterioration of ties and fouls ballast in the crossing. Smaller rubber slabs are used outside the rails, extending to the tie ends of the track.

The rubber slabs were molded, together with their metal reinforcing, in the Goodyear industrial rubber products plant at St. Marys, Ohio. Special wear and skid-resistant compounds were used. The surface is built with a diamond design molded into the rubber slabs and similar to the design on the Goodyear All-Weather tire tread.

Engineers expect the roadway to last indefinitely under normal conditions. The Akron crossing is expected to be a proving ground for various types of roadway crossing materials.

ARBA Bulletins Discuss Equipment, Other Topics

Four technical bulletins treating various phases of highway construction and maintenance, as well as the work of the association, have recently been published by the American Road Builders' Association.

Bulletin No. 209, entitled "Symposium on Road Equipment", includes six papers on such subjects as mechanization of construction operations, equipment development, problems of equipment manufacturers in producing better and more economical equipment, and the constractors' angle in the use of equipment in highway and airport construction. This bulletin is priced at $1.50.

Proceedings of the annual meeting of the association's educational division are presented in Bulletin No. 210. Topics discussed include graduate work in highway engineering, highway conferences, and short course and extension work. The bulletin is available for 75 cents.

Soil-cement is the subject of Bulletin No. 208, which treats the use of soil-cement in highway modernization and maintenance, as well as in subgrades. Bulletin No. 211 is devoted to winter maintenance of roads. These two bulletins are priced at 50 cents each.

Members of the association are entitled to one free copy of each of the publications. Others may order copies at the prices listed by writing the American Road Builders' Association, World Center Bldg., Washington 6, D. C.

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Book, Film Commemorate 50 Years of Cat Crawlers

In commemoration of its 50th consecutive year of crawler tractor manufacturing, the Caterpillar Tractor Co., Peoria, Ill., has published a 104-page book and released a film tracing the development of the crawler tractor from its earliest beginnings in 1904 to the present.

Entitled "50 Years on Tracks," the book was written by members of the Caterpillar staff. Organized in a series of chronological essays, the work discusses the evolution of the crawler from its beginnings in combines and tractors to the diesel-powered crawler. Copies are available from any Caterpillar dealer for approximately $1.25.

A 28-minute documentary film, "The Big Track," uses newsreel footage and film from the Caterpillar library to show the development of the crawler tractor in the last 50 years. Sequences show its applications in construction, farming, and wartime service. Walter Cronkite is narrator.

Another new film now available from the Caterpillar company or through its local dealers is a 20 minute sound color film dealing with highway safety and entitled "The Perfect Crime."

Describe Compactor With Segmented Steel Rolls

■ Two new booklets give engineering and performance data on the new Buffalo-Springfield Kompactor. Known as the K-45 "interrupted pressure principle" Kompactor, this new self-powered roller has four large-diameter rolls consisting of heavy welded-steel segments placed in staggered rows around each roll. This unique "staggered island" design permits the rolls to enter the loose material with a minimum of displacement in either forward or horizontal direction, and to leave without disturbing the compacted area.

The K-45 Kompactor is powered by a heavy-duty 110-hp diesel engine and is equipped with a torque converter. Compression on front and rear roll forms is 580 pounds per inch face.

To obtain Bulletins S-65854 and S-64854 write to the Buffalo-Springfield Roller Co., 1210 Kenton St., Springfield, Ohio, or use the Request Card at page 18. Circle No. 27.

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Alertness on tunnel project minimizes hazards to health

by GEORGE L. WILSON and HARVEY J. ROBERTS, West Virginia State Department of Health

As with any type of construction work, safety was of prime importance to the contractor, state department of health, and the men working on the half-mile-long tunnel on the recently opened West Virginia Turnpike. Guarding against tunnel hazards was the contractor's adherence to provisions set forth in its contract with the state department of health. But perhaps of greater importance to other contractors are some of the lessons Bates & Rogers Construction Corp., Chicago, Ill., learned regarding dust control, ventilation, noise, and the use of explosives on the project.

A good start toward making the job safe was Bates & Rogers' compliance with contract specifications on health and welfare. The contract's provisions were spelled out in detail, and the contractor knew the standards that would have to be met even before work began.

The contract not only specified the maximum amount of hazardous gases to be allowed in the tunnel atmosphere, but also required that the oxygen content should not fall below 14 per cent. The amount of free silica dust allowed was also specified, and this provision required wet drilling and the continuous wetting down of the muck pile during operations.

The required ventilation plant, with a minimum capacity of 20,000 cfm, had to operate around the clock, six days a week, and for at least two hours before work began on Mondays. A fire boss, certified by the West Virginia State Department of Mines, was required to be employed; he checked for explosive gases before work began on Mondays, made routine checks during working hours, and acted as a general safety inspector. A qualified professional engineer was required to act as safety engineer.

Men showing evidence of silicosis or any pulmonary condition which would be aggravated by underground work were rejected in a pre-employment physical examination. And as a final guard, the contractor was required to carry workmen's compensation insurance with the West Virginia Workmen's Compensation Commission.

Tunneling Operations

Excavation of the 2,665-foot-long tunnel began at the south portal, near the town of Standard. (See "West Virginia Builds New 88-mile Toll Highway", C&E October, 1953, pg. 74.) About 100,000 cubic yards of rock had to be removed for the 35-foot-wide and 33-foot-high facility. With a semicircular arch and straight sidewalls, the tube provides a roadway 24 feet wide.

Drilling was done from a jumbo having 13 drifter-type pneumatic drills on four levels. Holes ranged from 1⅞ inches to 2⅜ inches in diameter, and their depth ran from 7 to 13 feet. Each drill required about half a gallon of water per minute. On an average, about 128 full-length and 29 half-length plug holes were drilled on each round. Depending on the depth of the holes, drilling required from 2½ to 3½ hours.

Industrial hygienists working at the heading experienced a severe ringing

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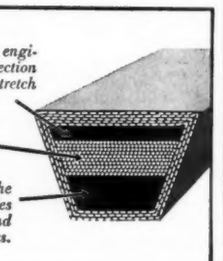

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Knowledge gained with explosives, ventilation, and noise on turnpike job can be applied by any tunnel contractor

in their ears and a partial deafness lasting several days after being exposed to noise during drilling. This discomfort was eliminated after suitable earplugs were obtained and used. Drillers stated that they became accustomed to the noise but it seems likely that damage to hearing could result from prolonged exposure to the noise. Since drillers follow this type of work about the country, and their exposure is usually of many years' duration, they might be subject to ear injuries. For this reason, tunneling contractors may find it advantageous to obtain earplugs from safety-equipment manufacturers and issue them to drillers, helpers and other men who habitually work near the heading during drilling.

About 2.8 pounds of 40 per cent dynamite was required for each cubic yard of rock removed. After the jumbo was moved back about 125 feet and workmen were outside, a shot was fired to remove from 235 to 415 cubic yards of material. Muck, relatively free of fines, was removed by a 2-yard diesel shovel about half an hour later, when the foreman and fire boss had completed their inspection. Muck was dozed away from the heading by a bulldozer, loaded into diesel-powered LeTourneau Tournarockers, and disposed of in an area outside the portal.

When mucking was finished, the jumbo was towed to the heading, steel roof supports set, and the cycle repeated. The length of cycles varied from 8 to 15 hours, depending on the amount of rock to be removed.

During each shift, there were between 30 and 35 men at or near the heading. Electricians, laborers, and others increased this number slightly during the day shift. Drilling took about ¼ of the time, and mucking, 1/3 of the time. The balance was spent on work which caused little or no air contamination.

Tunnel Atmosphere

The ventilation system had a blower and motor just outside the portal, with a 26-inch-diameter steel tube to deliver air to the heading. The outlet of the tube was kept as close to the heading as possible without its being damaged. Ordinarily, it was about 120 feet away.

The velocity of the air leaving the pipe was sufficient to sweep around the heading and remove dust and fumes. Immediately after shooting, air was exhausted from the heading to remove most of the fumes and dirt. After several minutes, this flow was reversed, and fresh air was delivered to the heading until the next shot was fired. In addition to air supplied by the ventilation system, about 3,000 cfm of air was supplied to the heading while drills were in operation.

Routine checks of air in the tunnel were made by the Bureau of Industrial Hygiene, West Virginia State Department of Health. Most samples were first taken at or near the heading, since all of the men were concentrated in this area. Later, samples were taken at various locations, from portal to heading.

Test drilling had indicated a high free silica content in the rock, which was primarily sandstone with an intermixture of small amounts of mica, silica-bearing shale, and occasional narrow seams of coal. Samples showed the percentage of free silica to be relatively constant, however. During drilling operations, samples for airborne dust and free silica were taken at various locations near the jumbo, and the free silica content was found to be the same as it was during mucking.

During the mucking operations, samples for dust counting were usually taken at the heading, ahead of and behind the mucking shovel, and at the top and bottom of the jumbo. Samples taken at the jumbo location, about 125 feet from mucking operations, showed little difference from those taken near the shovel. Similarly, there was little difference between samples taken at the bottom and top of the jumbo, indicating that dust produced by mucking was dispersed rapidly through all the available space. Both wet drilling and the continuous wetting of muck kept dust under control. The large amount of

Carnaghi digs into lubrication problem...comes up with answer

Ray J. Carnaghi (right) discusses lubrication of equipment with Frank Wolan, Standard Oil automotive engineer. Frank has been serving customers for Standard Oil since completing the Standard Automotive Sales Engineering School. He got his engineering training at Michigan State College. Customers have found Frank's experience and training pay off *for them.*

Contractor Joseph P. Carnaghi & Sons dig foundation for new building. STANOLUBE HD-M Motor Oil is used in all Carnaghi equipment.

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Like every outfit in the business of moving earth, Joseph P. Carnaghi & Sons, Detroit, know what it means to keep equipment on the move. There is no place on the schedule for stuck rings, bearing failures, fouled plugs. Down time due to lubrication failure is something Carnaghi learned how to eliminate 20 years ago. It was then that this contractor began using Standard Oil products.

Now STANOLUBE HD-M Motor Oil is used in Carnaghi trucks, cranes, shovels and dozers. Earth haulers that go away heavy and come back light, give oil a full challenge to deliver trouble-free operation. Wet, dry, heat, cold, and grit are the order of business for dozers, shovels, and cranes. They give motor oil tough, rugged jobs to do.

STANOLUBE HD-M stands up to the jobs Carnaghi gives it with a wide margin to spare. It is designed to do just that. Carnaghi equipment maintenance men have found this out from inspection of equipment at overhaul time. Their skilled maintenance, teamed with STANOLUBE HD-M, result in:

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This sound like the kind of operation you would like for your equipment? A Standard Oil automotive engineer will be happy to tell you how, with STANOLUBE HD-M, you can get it. In the midwest, a call to your nearby Standard Oil office will bring prompt response. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (Indiana)

water used kept the tunnel floor wet so that trucks raised little dust.

Dynamite Fumes

All the dynamite used was acceptable for underground use. Initially, a "redipped" type was used, but when the job was about half finished, a "sprayed" type was substituted. This appeared to produce a lesser amount of fumes, although, as the tunnel progressed, there was more time for the fumes to become diluted with air delivered to the heading. The smaller shot used later, and the lesser amount of paraffin on the sprayed dynamite probably played a part in the smaller amount of fumes noted. However, the sprayed dynamite seems to be more favorable for tunneling work such as this.

The large quanitity of carbon monoxide produced by the dynamite was diluted considerably by air from the ventilating system. Gasoline-powered trucks were insignificant as a contributor to carbon monoxide because of the limited amount of time vehicles were in the tunnel. Of the two possible sources of oxides of nitrogen, the highest concentrations were found in the fume from dynamite.

Oxygen never fell appreciably, remaining between 20.7 and 20.8 per cent, well above the 14 per cent minimum requirement. Aldehydes, produced in diesel engines, were not present in quantities sufficient to be considered dangerous to health. And although the presence of sulfides was considered possible because of the action of water on coal, it was not detected.

Eye Irritation

A No. 2 fuel was first used in diesel equipment operating underground. This concentration of exhaust products resulted in some irritation described by different observers as "slight" to "moderate". As a result, the bureau suggested that equipment be operated on No. 1 fuel, a low-boiling product which vaporizes more readily and burns more completely. Once the change was made, eye irritation was seldom noticed.

This experience also indicated the importance of maintaining equipment in the tunnel in good mechanical condition. The air filter equipment must receive special attention, since satisfactory combustion will occur only when uncontaminated air is introduced into the engine. Injectors should be adjusted so that no combustion takes place in excess air, and the air-fuel ratio should be 20 to 1 or less. If the operator takes the throttle up gradually after an idling period, the excess fuel in the combustion chamber will be burned with excess air.

If diesel-powered equipment is to be used safely in a confined area, calculations for ventilation must take this into account. One method, and a sound one on the basis of this work, recommends that minimum ventilation where diesels are used be 25 to 50 times piston displacement at maximum rated speeds.

Wet drilling, the generous use of water during mucking, and the ventilation system kept the dust concentration within acceptable limits. The ventilation system was adequate for diluting or removing fumes and gases, but sometimes proved inadequate for removing burned or partially burned fuel. An auxiliary fan of similar capacity, would have supplied adequate ventilation under all conditions and cleared the heading much sooner after shooting.

This second unit would have had to be operated only after the shot and until diesel fumes from mucking were exhausted. This would have permitted a more frequent inspection and maintenance of equipment, reducing the likelihood of breakdowns, and the time saved would have offset the cost of the additional unit.

Howard, Needles, Tammen & Bergendoff, New York, N. Y., was general engineering supervisor of all construction, and was engineer on tunnel construction. The designing engineer for the tunnel was Singstad & Baillie, New York, N. Y. THE END

(From "Health Hazards in Tunnel Construction" by George L. Wilson and Harvey J. Roberts, in the American Medical Association Archives of Industrial Hygiene and Occupational Medicine, August, 1955.)

Bucket-Wheel Ditcher Teamed With Tractor

■ The new Unimatic CW-4 detachable ditcher that is teamed with the Caterpillar D4 tractor is described in a booklet from Unimatic Corp., P. O. Box 1166, Tulsa 1, Okla. The prime features discussed in this booklet are the unit's special hydraulic drive, the digging-wheel drive, and the conveyor. All of these hydraulic components are illustrated.

The advantages of operating this combination Caterpillar tractor and Unimatic ditcher, as well as the various uses to which this machine can be applied, are discussed. Details on the detaching procedure and over-all specifications complete the booklet.

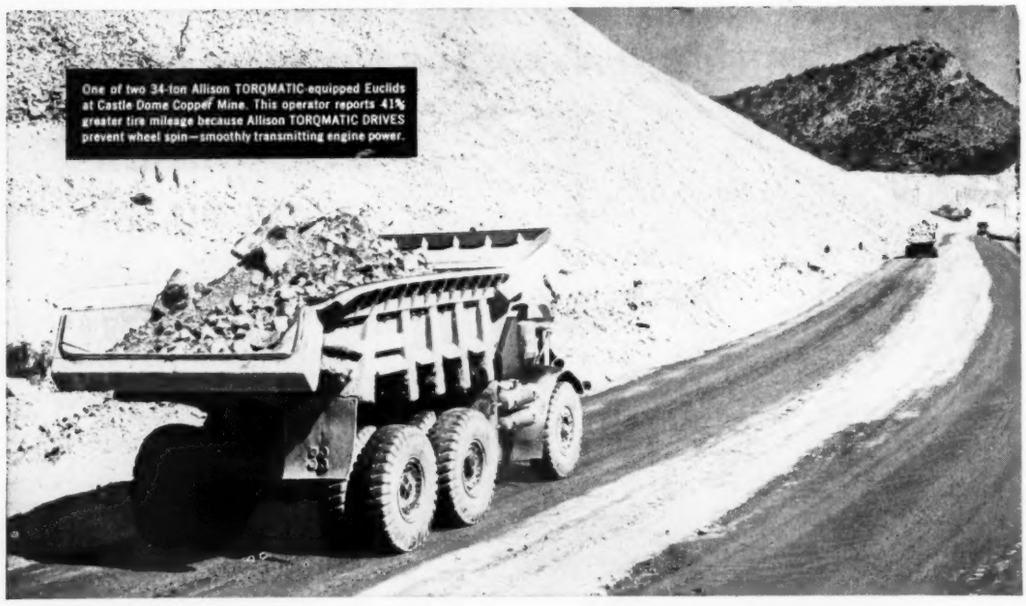
To obtain Form 5401 write to the company, or use the Request Card at page 18. Circle No. 7.

Sixteen Attachments For Tractor Shovels

■ Useful attachments for Payloader tractor shovels are illustrated in a new piece of literature offered by Frank G. Hough Co., 762 7th St., Libertyville, Ill. Sixteen attachments described include rotary, V-type, and trip-blade snowplows; a hydraulic backhoe; a backfiller blade; a crane hook; a lift fork; a lumber-log rack; a pickup sweeper; and a land-clearing rake. Cabs, winches, and scarifier teeth are also shown.

The entire line of seven sizes of Payloader tractor-shovels is also shown.

To obtain this literature write to the company, or use the Request Card at page 18. Circle No. 3.


One of two 34-ton Allison TORQMATIC-equipped Euclids at Castle Dome Copper Mine. This operator reports 41% greater tire mileage because Allison TORQMATIC DRIVES prevent wheel spin—smoothly transmitting engine power.

"41% longer tire life"

Castle Dome Copper Company reports it gets 17,000 miles per tire on off-highway trucks equipped with Allison TORQMATIC DRIVES compared to 12,000 miles per tire on mechanical-drive units. But increased tire life is only part of the story — the firm also reports the TORQMATIC-equipped "Eucs" have better availability and production records.

This operator runs a fleet of 12 trucks —2 TORQMATIC-equipped "Eucs" and 10 mechanical-drive units — hauling 390,000 tons of ore and overburden per month up 8% grades on mile-long runs. The "Eucs" average 25.3 trips per 8-hour shift, each hauling about 58,000 tons per month.

TORQMATIC DRIVES smoothly transmit engine power—help prevent wheel spin that can quickly strip the tread from a tire. There's no clutch pedal to push and only three forward gearshifts—instead of the usual 7 or 10 — handle all loads and grades. The *matched* converter-transmission team balances engine power and load demand, absorbs harmful drive-line shocks, prevents damage to drive-line components, helps stop engine lugging.

You, too, can cut your operating costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

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ALLISON TORQMATIC DRIVES

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- **Cuts** driver training costs
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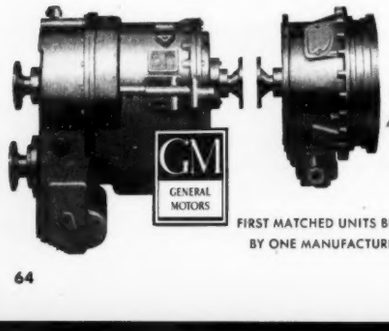

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PIERS FOR THE THREE MILE BRIDGE over the Hudson River on the New York State Thruway between Nyack and Tarrytown created no problem for Merritt-Chapman & Scott Corporation of New York City. Of a total of 23 piers, 15 were built with cofferdams, two for each pier. Dependable, 8" AGC rated Marlow Self-Priming Centrifugal Contractor's Pumps were used on the job to dewater the cofferdams quickly and handle seepage water efficiently.

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Construction bids must be *right* to get the job and make a profit! Progressive operators use new methods and modern equipment to reduce costs. When it comes to pumping jobs, more and more contractors know they can depend on rugged, efficient Marlow Self-Priming Pumps or famous Marlow "Mud Hogs" to get the job done *on time* with little attention and low maintenance. See your Marlow dealer or write for Bulletin C-52.

MARLOW PUMPS • RIDGEWOOD, NEW JERSEY
Division of Bell & Gossett Company

Line of Concrete Mixers For Volume Production

■ Its line of modern volume-production concrete mixers is illustrated in a catalog available from Koehring Co., 3026 W. Concordia Ave., Milwaukee 16, Wis. These mixers fall into the 1 to 4-cubic-yard-capacity category and are used primarily in construction work for large dams, canals, and buildings, as well as in commercial central and ready-mix concrete plants.

Both the tilting and non-tilting types of construction mixers are discussed in the catalog. A breakdown of the structural features of each type of mixer is included, along with plant pictures showing mixer installations at commercial and construction projects. Koehring produces the non-tilt construction type in 1, 2, and 3-cubic-yard sizes and the tilting concentric zone type in 2 and 4-cubic-yard sizes.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 19.

Three M-C & S Men Elected To Osgood-General Board

Three members of Merritt-Chapman & Scott Corp., New York, N. Y., have been elected to the board of directors of Osgood-General, Marion, Ohio, a wholly-owned subsidiary of Marion Power Shovel Co. To date, M-C & S has acquired a greater than 90 per cent interest in Marion through an exchange of shares.

Board members are William Denny, M-C & S executive vice president and general manager; Rolland O. Baum, a vice president; and Marshall G. Staub, treasurer. The three replace J. L. Halberstein and Jay H. Maish, and fill a vacancy that had existed on the company's seven-man board.

Mr. Denny and Lewis M. Schott, a vice president of M-C&S, have been named members of the three-man board of directors of C. A. Pitts General Contractor, Ltd., of Toronto. This is a Canadian firm which Merritt-Chapman & Scott has acquired and will operate as a subsidiary. The new directors replace Corti Boland and Duncan Campbell, who will continue as vice president and secretary-treasurer, respectively, of the Pitts organization.

A recent addition to the sales engineering staff of Merritt-Chapman & Scott is Harry C. Grieme. He will work under the vice president of the company's industrial and building construction division.

Expansion at Acker Drill

Acker Drill Co., Inc., manufacturer of drilling equipment, has added a brick and steel wing to its plant in Scranton, Pa. The new facility, providing an additional 35,000 square feet of floor space, has been placed in operation.

Lincoln Sponsors Eighth Competition in Design

The James F. Lincoln Arc Welding Foundation has announced the eighth annual competition of its engineering-undergraduate design program. A competition in mechanical or structural designs, it is open to all engineering undergraduates regardless of their familiarity with the mechanics of the arc welding process. Entries may be based on undergraduate studies.

The program offers 46 awards for papers of no more than 20 pages presenting the welded design of a machine, machine part, structure, or structural part. The first award is $1,250. No special forms, fees, or conditions are needed to enter the competition. A booklet containing rules and conditions of the 1954-1955 contest is available from the James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. June 27, 1955 has been set aside as the deadline for all entries.

Folder Shows Imported Surveying Instruments

■ A new folder on engineers' and surveyors' transits, levels, and planimeters has been released by Umeco Optical Division, 465 California St., San Francisco 4, Calif. The folder gives full details and prices on this company's line of imported instruments.

To obtain this literature write to the company or use the Request Card which is bound in at page 18. Circle No. 23.

NEW GARRETT All-Drive

RUBBER TIRES 4-WHEEL DRIVE

has them ALL TALKING!

because

FASTEST RIG you've ever seen, on the job or between jobs. Travels streets and highways without permits or loading, rolls over curbs without damage.

EXTRA POWERFUL through reduced number of moving parts, less friction—38.6 h.p. at the drawbar.

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CUSHIONING EFFECT of rubber tires makes the whole machine last longer, lessens operator fatigue. You'll see *more work* turned out every day!

For complete information, see your International Harvester distributor, or mail this coupon TODAY!

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Please send full information on the All-Drive.

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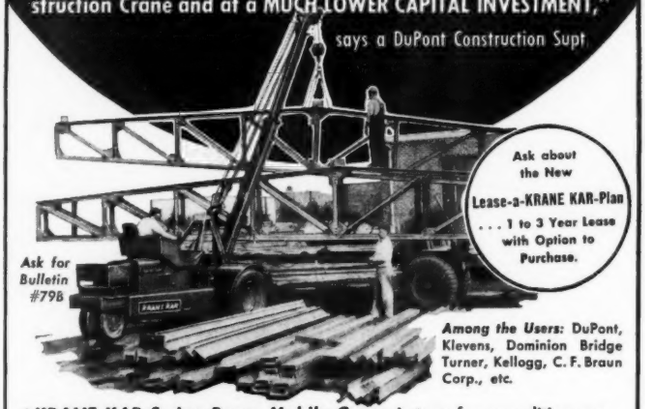
"KRANE KAR for what it is intended to do*, will do it BETTER, FASTER, and SAFER than a Conventional Construction Crane and at a MUCH LOWER CAPITAL INVESTMENT," says a DuPont Construction Supt.



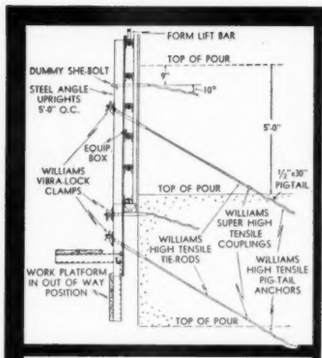
Among the Users: DuPont, Klevens, Dominion Bridge Turner, Kellogg, C. F. Braun Corp., etc.

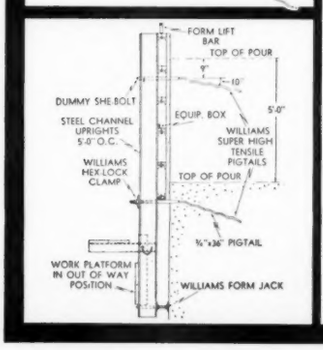
**KRANE KAR Swing-Boom Mobile Crane* is tops for expediting materials-handling anywhere on project site, in the shop, yard, and storage.

1½, 2½, 5, 10, and 12½ Ton Cap. Gas or Diesel. Solid or pneumatic rubber tires; 9 to 37 ft. booms or adjustable telescopic booms. *Accessories:* All-weather Cabs, Snow Plows, Buckets, Electric Magnets, etc.

For BOX CAR Loading or Unloading ask for information on Special *KRANE KAR* Model AXB

SILENT HOIST & CRANE CO., 898A 63rd ST., BROOKLYN 20, N.Y.





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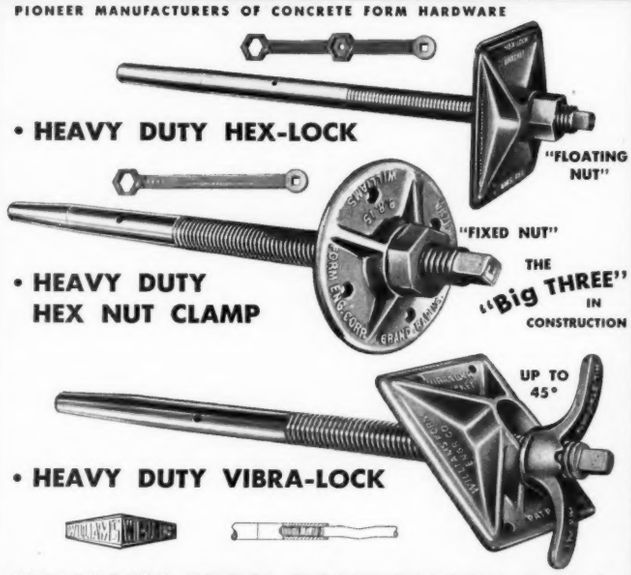

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Comprehensive Catalog Of Drilling Equipment

■ Its complete line of modern drilling equipment is described in a new bulletin released by Gardner-Denver Co., Quincy, Ill. The literature emphasizes that through the use of hydraulic drill jumbos and power-feed rock drills, tunnel contractors and mine and quarry operators are increasing the percentage of actual drilling time per cycle and the footage drilled per shift.

Bulletin J-100 describes straight and offset hydraulic booms, hydraulic lift and swing cylinders, and hydraulic pumps for mounting on any suitable chassis or vehicle. Also described are completely equipped hydraulic drill jumbos for rail service, the self-propelled Gardner-Denver Mobiljumbo with remote drill controls, roof-pinning jumbos, and tractor-mounted jumbo units complete with air compressor.

To obtain Bulletin J-100 write to the company, or use the Request Card that is bound in at page 18. Circle No. 12.

Sales Manager Named By Leschen Division

The Leschen Wire Rope Division of H. K. Porter Co., Inc., St. Louis, Mo., has appointed G. F. Ryan sales manager of the New York district. He will be in charge of sales activities in New York, New Jersey, the New England states, eastern Pennsylvania, and Maryland.

HRB Booklets Discuss Accidents, Sand Drains

Five papers based on accident studies and presented at the 33rd annual meeting of the Highway Research Board are contained in Highway Accidents and Related Factors, one of two new bulletins issued recently by the HRB.

Subjects treated include the psychology of trip geography, an analysis of causative factors in highway accidents; rural intersection accidents, based on a study in Delaware; effect of shoulder width on accidents on two-lane tangents, based on a California study; effect of enforcement on vehicle speeds; and automobile-barrier impacts.

Vertical Sand Drains, the second bulletin, contains two papers. The first presents results of a series of borings and laboratory tests measuring the change in moisture content and shearing resistance of a soft silty clay before and after the consolidation period. The second paper reports on Hawaii's experience with vertical sand drains.

Bulletin 91, on highway accidents, is priced at 75 cents, while Bulletin 90, on vertical sand drains, is priced at 60 cents. Both may be obtained by writing the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

Brochure on Lift Truck

■ The new Hyster 15,000-pound-capacity lift truck is described in a recent brochure. Action photographs, descriptive data, and specifications are given on the Model RC-150.

Ease of steering is one of the chief features of the big model. According to the literature, the wheels can be turned on any kind of ground with the operator having only one finger on the steering wheel.

To obtain Form 1287B write to the Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg., or use the Request Card at page 18. Circle No. 28.

Flywheel Couplings For Industrial Engines

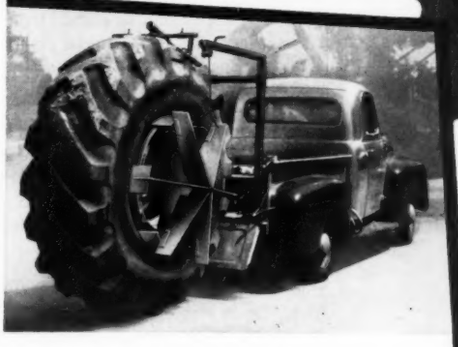
■ Industrial-engine flywheel coupling units that will fit eight models of Chrysler engines and 29 models of Ford engines are illustrated in data sheets available on request. The manufacturer of the Morflex flywheel couplings is Morse Chain Co., 7601 Central Ave., Detroit 10, Mich.

The units include a torsionally flexibile shock-resistant waterproof standard Morflex coupling and a balanced cast-iron adapter-plate that bolts to the engine flywheel through the clutch-bolt circle holes. The units are sold with the adapter-plate drilled to suit the particular engine model.

To obtain data sheets FS 41-54 write to the company, or use the Request Card at page 18. Circle No. 13.

TURN HEAVY TIRE CHANGES INTO PROFIT
WITH THE
TIREMATIC
TIRE CHANGER

IT'S SAFE, FAST & EASY TO OPERATE! fits all size tires!



- Easy Hydraulic Operation
- Requires no motors, air compressors or other auxiliary equipment.
- Can be permanently installed for service in shop.
- Adaptable for mounting on any truck for field use.

The U. S. Government, State Highway Departments, Counties, Cities, Towns and Contractors everywhere are turning to the *TIREMATIC* as a superior saver of Time, Labor and Expense.

Built of light but rugged material, *TIREMATIC* removes the biggest and toughest tires without damage to tire, tube or wheel rim, and without danger to the operator.

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A SAFER FASTER MORE RUGGED SNATCH BLOCK

THE NEW LEBUS "TRUCKER'S" SNATCH BLOCK

Undoubtedly the Finest Snatch Block ever designed, constructed and presented to the industry. This new LeBus Block has been engineered for all types of heavy trucking, construction and rigging work. Special emphasis has been placed on STRENGTH, SAFETY and EASE OF OPERATION. Only TOP QUALITY carbon and alloy steels are used in the construction and all parts are drop forged, heat-treated and processed to withstand the most rugged service. Like previous LeBus blocks, the new "Trucker's" Snatch Block requires no tools other than your hands, and can be taken completely apart within a matter of seconds.

For more information write direct or have your supply source write for catalog page 1500 for complete information on the four sizes of LeBus Blocks.

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The MILLER
BITUMINOUS CONCRETE AND AGGREGATE SPREADER

The most widely accepted lightweight, low-cost spreader in the world.

Long experience on thousands of jobs proves these advantages:

Automatically levels material despite any base irregularities.

Sturdy—Simple—Requires no maintenance or replacement.

Lightweight—easily moved and maneuvered on job site.

Versatile—Lays any width, any thickness up to 8", either hot or cold mix black top, and aggregate.

Economical—Handles one ton per minute . . . cuts hand labor costs 90%.

Universal Use—Can be towed by any truck equipped with hitches clamped on in several minutes.

Write today for free literature and name of nearest dealer.

THE MILLER SPREADER CORP.
120 PIKE STREET · · YOUNGSTOWN 2, OHIO

Equipped with an 85-foot boom and 25-foot jib, this Bucyrus-Erie 38-B crane swings a bundle of reinforcing steel to the sixth floor. The crane also hoisted most of the concrete to the upper floors in either a Gar-Bro bucket or Gar-Bro twin hopper. *C&E Staff Photos*

Forming method conserves materials on hospital job

The University of Mississippi's Medical School and Teaching Hospital, now under construction at Jackson, Miss., is a key link in the state's hospital system, designed for the training of all types of hospital personnel. Located in the central part of the state, it will provide Mississippi with a clinical teaching and research facility fully integrated with a basic teaching and research unit. The structure, designed in the form of a T, contains seven stories and a ground floor. Concentrated in the crossbar of the T will be the 350-bed hospital; the rest of the building contains most of the medical school facilities.

Construction cost of the $9 million structure is being shared by state and county, with federal participation through Hill-Burton Act funds. Separate contracts were let for the general, electrical, mechanical, elevator, and well work. The $4,523,134 general contract, representing about half of the total expenditure, is held by Farnsworth & Chambers Co., Inc., Houston, Texas. Grading and preparation of the site started late in 1952, and the entire project is scheduled for completion in March, 1955.

Bell-Bottom Piles

The hospital-school is built on subsoil consisting of layers of silt, clay, and sand, deposited in prehistoric times when this area was part of the bed of the Gulf of Mexico. Below this, a solid strata of blue clay provided bearing for 700 piles. Auger-type drills bored 20-inch holes to a depth of 25 feet, and sub-reamers belled out the bottoms of the holes to as much as 6 feet in diameter.

After cages of reinforcing steel had been suspended in these drill holes, the holes were filled with concrete. In most instances, it was possible to make the pours directly from the truck mixers. Jackson Ready-Mix

NEW!
FOR HOT AND COLD BITUMINOUS MIXES . . .

LITTLEFORD
MODEL 700
"TRAIL-O-PATCHER"
BITUMINOUS MIXER

CAPACITY—TPH
HOT-MIX — 7 TON
COLD-MIX—12 TON
(7 CU. FT. BATCH)

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A COMPLETELY SELF-CONTAINED UNIT
for *higher production* at lowest cost . . . . .

Highway Departments and Contractors can now make aggregate patch mixes right on the road with the Littleford Model 700 Trail-O-Patcher. This engineered unit is another Littleford first—it's a self-contained unit with combination pugmill and dryer, bitumen metering system and 200 gal. bitumen tank—it requires no special equipment to do the mixing job. Model 700 Trail-O-Patcher will produce 7 tons of hot-mix or 12 tons of cold-mix per hour. Heat can be applied while the aggregate and bitumen are being mixed or the heat can be deflected from the mix—this is controlled heating.

For mixing anywhere, in any weather, the Trail-O-Patcher gives accurate mixes at the lowest cost.

Model 700 Trail-O-Patcher is designed to perform maintenance work on roads, streets, highways, parking areas, runways and driveways. It's highly portable and a completely engineered unit. For further details see your nearest Littleford Dealer or write.

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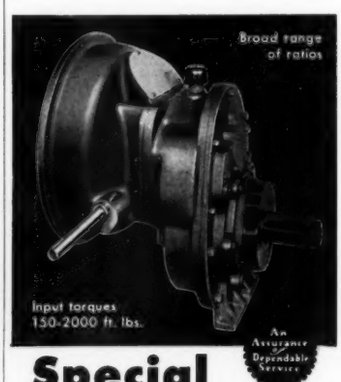

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HEAVY-DUTY
TRANSMISSIONS

"Engineered-to-order"

Erection and wrecking of forms is simplified in work on $9 million facility for the University of Mississippi

Bricklayers, working from a Safway scaffold on the ground, begin the job of placing close to a million bricks in the seven-story building. At upper floors, crews will work from a Safway hanging scaffold.

Concrete Co., Jackson, supplied concrete for the piles as well as for the rest of the structural frame.

Concrete beams 16 inches deep capped the piles and provided the base for the reinforced-concrete building frame. Most of the piles were spaced at 20-foot centers both ways. Columns of the superstructure rested directly over the piles. Beams span the columns in an east and west direction throughout the building, and floor slabs span between the beams.

Form Design Simplified

Construction of the reinforced-concrete structural frame of the building was facilitated by a method of forming which allowed forms to be erected, adjusted, and stripped simply. The basis of the form system was the Acrow adjustable shore. Beam forms were first set up between the columns and supported by Acrow shores which were spaced at 4-foot intervals along the beams and capped with short lengths of 4×6. Rows of 4×6 stringers, spaced 4 feet apart, were next set up parallel to the beams and supported at the ends only by shores. Later, additional shores were placed under the stringers to provide adequate support for the concrete.

The next step was to lay 4×4 joists on the stringers. These joists were simply rolled out into place at approximately 2-foot spacing, but no attempt was made to space them accurately. The 4×4's simply lay across the stringers loosely and were not nailed down. Sheets of ¾-inch Plyform were then laid over the joists and tacked down with 6 to 10 nails in every 4×8-foot sheet. These nails served to keep the sheet from being dislodged by wind or accidental scuffing.

The only nails in the slab system were one or two in the head of each

(*Continued on next page*)

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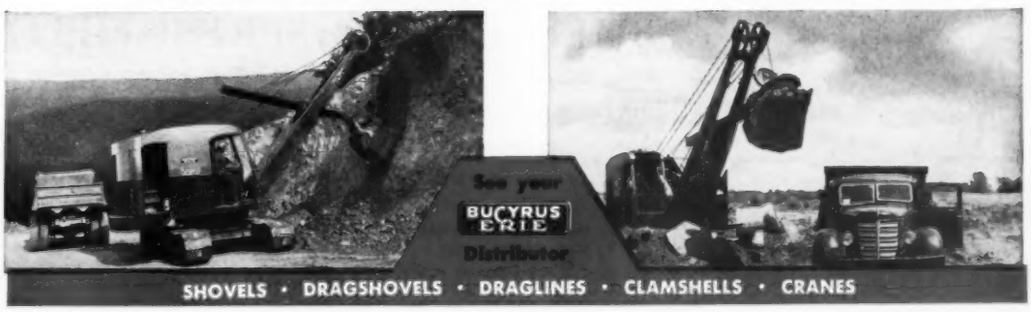
BUCYRUS-ERIE COMPANY South Milwaukee, Wisconsin



SHOVELS • DRAGSHOVELS • DRAGLINES • CLAMSHELLS • CRANES

(*Continued from preceding page*)

shore to keep the stringers from falling off during erection. Ten or fewer were used in each sheet of Plyform, and only a few in braces supporting the stringers. Forms were quickly and easily brought to exact grade by a simple adjustment of the shores. Wedges were not used.

After the concrete was poured, these forms were quickly and easily wrecked by loosening and removing the Acrow shores. Since there were only a few nails in the lumber, there was very little damage to the material and pieces were ready to be used again immediately. The uniformity of panel size throughout the structure made it possible to re-use the Plyform decking many times without much loss from cutting. Such cutting of the panels as was necessary was done with a SkilSaw, powered by a Kohler generator.

Workmen set a 4 x 6 stringer on one of the Acrow adjustable shores which speeded form erection and wrecking. *C&E Staff Photos*

Approximately 4,000 of the Acrow No. 815 shores were in use on the building during construction of the structural frame. Forms for columns were made of panels, with the lumber running the length of the panels. Universal steel column clamps tied the panels together. Column forms were braced in a north-south direction to keep them vertical.

Placing Concrete

Reinforcing steel, hoisted to the several floors by a Bucyrus-Erie 38-B crane, was tied into cages and mats on the decks after forms were erected. Columns were poured before the slab steel was placed, so that concrete could be wheeled on the smooth deck. The 38-B crane, using a 1-yard Gar-Bro bucket, hoisted concrete to the proper floor and discharged it into buggies which were wheeled to the column forms.

For the larger pours, a Gar-Bro twin concrete hopper with a capacity of 3 cubic yards was set up on the floor. The crane then bucketed concrete from the ready-mix trucks to the hopper, which could load two buggies simultaneously. Mall and Homelite electric vibrators compacted the mix. Early in the construction, three Kohler generators supplied electrical energy on the job. During later stages, power came from the municipal supply system. Floors were floated and finished by a Whiteman mechanical float finisher powered by a Wisconsin engine.

In order to reach from the ground to the upper levels of the building, the Bucyrus-Erie crane was equipped with an 85-foot-long boom and a 25-foot jib. Most of the concrete, as well as bulky materials such as lumber and reinforcing steel, was hoisted by this machine.

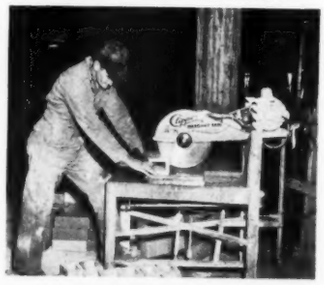
Brickwork

Bricklayers started work on the exterior walls as soon as concrete operations were out of the way. Safway pipe scaffolding erected from the ground provided a working platform for lower levels. As soon as the roof slab was poured on a section of the building, Safway hanging scaffolds were placed to carry these crews working on the upper levels. Looped anchor rods one inch in diameter were cast in the roof slab to tie down beams supporting the hanging scaffolds.

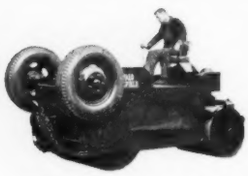
Mortar for bricklaying was mixed in a Dandie Kwik-Mix 6 mortar mixer, set up on the south side of the building close to the hoisting tower. Mortar was discharged from the mixer to a mortar box, shoveled into wheelbarrows, and wheeled to the tower. The skip carried the wheelbarrows to the desired floor, where they were wheeled to the bricklayers on the scaffold. As many as 50 bricklayers were supplied with mortar by the one mixer. Nearly a million bricks make up the exterior faces of the building, together with glass and aluminum panels.

Installation of mechanical and electrical facilities, and interior finishing, followed the work of the concrete crews closely. In addition to the usual piping and duct work for water, steam, electric power and lighting, and ventilation, this building will also be equipped with a central oxygen system to all hospital rooms, central suction system, and a complete

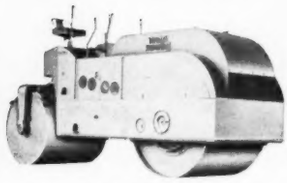
A Clipper masonry saw cuts glazed tile to size for use in the interior.



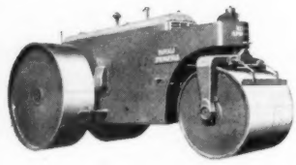
Sign of Progress...



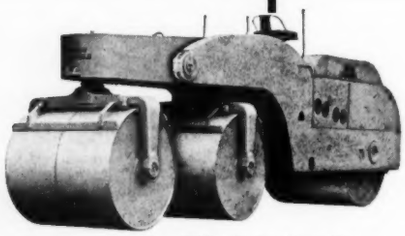
3-5 Ton Portable Tandem Roller



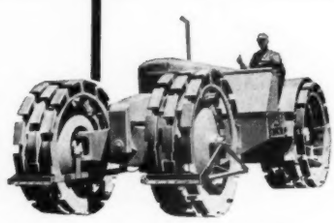
Two Axle Tandem Rollers



Variable Weight 3-Wheel Rollers



KX-3 Axle Tandem Roller



K-45 Kompactor

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air-conditioning system. Hangers for electrical conduits were cast into the bottom face of the floor slabs. Other piping and ducts were supported by studs driven into the concrete with powder-actuated tools.

Metal door and window frames were set in place with the aid of a Remington 32-caliber powder-actuated stud driver. Using ⅜-inch studs, this machine quickly anchored the frames into the concrete floors or brick walls.

Because of the standardization of rooms and the use of the same types of ceramic and glazed tile throughout the building, there was a minimum of cutting and fitting of tile. Odd pieces that had to be cut were similar from room to room and could be mass-produced. Clipper masonry saws set up at convenient locations did this sawing.

Three Jackson architects pooled their talents under the title of MNO Associated Architects for the design of the structure. By careful study and standardization of as many items as possible, they were able to keep the costs down to $19.40 per square foot for everything except the land and landscaping. Examples of standardization are the use of the same types of glazed tile, ceramic tile, and floor coverings throughout the building. Toilets and laboratories are located so that plumbing runs are minimized. Throughout the building, many of the structural units and structural details are similar.

Typical Floor

On a typical floor, the hospital wings consist of a series of single, two, or four-bed rooms, together with nurses' headquarters and storage and utility rooms arranged on either side of a central corridor. Two such hospital wings form the crossbar at the top of the T-shaped building. Laboratories, classrooms, and offices are located in the stem of the T, on either side of a double corridor. At the junction of the three wings, the corridors connect in such a way that the teaching and practice facilities are closely correlated.

At the basement and first-floor levels, the stem of the T is widened by two-story additions on both sides, so that the area of these floors is practically double that of the upper floors. The hospital lobby, staff offices, and dining rooms occupy most of the first floor. A large area is used for examination and treatment rooms for out-patients. Another area contains the ambulance entrance and receiving section. Offices for some of the medical school staff as well as student and faculty lounges are located in the school wing on this floor.

Food storage and preparation facilities, and storage spaces for everything from medical records to ice, occupy a large part of the basement. Air-conditioning equipment is also located on this floor.

A separate service building, measuring 163×213 feet, will be located just to the east of the main structure. Boiler house, incinerator, laundry, and miscellaneous shops will occupy about half of this building. The balance will be utilized for the housing of animals used in experiments. A service tunnel will connect the main building and the service building.

As construction of the hospital nears completion, the contractor will grade around the structure and construct access roads and parking lots. Plans and specifications provide for the construction of clay-stabilized gravel bases for roads and parking lots. This base will be primed with cutback asphalt MC-1 at the rate of 0.25 gallon per square yard, and surfaced with about one inch of plant-mix bituminous surfacing. Nearly a quarter of a million dollars is involved in site grading and road construction.

Personnel

Farnsworth & Chambers employed an average of 150 workmen on their part of the construction, and peak employment reached about 200. With the aid of a Ditto setup, the entire payroll was prepared in the field office by one employee under the supervision of B. J. Chaisson, purchasing agent for the project (see C. & E., Aug., 1954, pg. 44). Karl Helm was superintendent for the general contractor, and John Leverton was assistant superintendent.

The owners were represented through MNO Associated Architects by William L. Gill, project manager, and Frank Rice, job supervisor. Dr. David B. Wilson is director of University Hospital, and Dr. D. S. Pankratz is director of the University Medical Center. THE END

With a Remington 450 stud driver, a workman sets studs in the concrete floor.

Non-stop 180° turns in 28′ width speeds road job

Positive power steer and 90° turning angle give operator safe control . . . let him maneuver rig easily in close quarters.

To speed a road relocation job between Shavertown and Arena, New York, White Oak Excavators, Inc., Plainsville, Connecticut, added 2 C Tournapulls to their equipment fleet. In 4 months, these 2 electric-control rigs handled about 40% of the total yardage (200,000 yards). Twelve shovel-loaded dump trucks, plus 2 crawler-drawn scrapers, handled the rest (300,000 yards). Each Tournapull accounted for 100,000 yards . . . average for each shovel-loaded truck and pusher-loaded crawler-scraper, about 21,500 yards.

Most of the time, Tournapulls loaded out of hillside cuts along the 7½-mile route. Material handled was clay and muck, interlaced with small and large rocks. Fill areas usually were narrow, with high banks on one side and drop-offs on the other, making turn-arounds difficult. Foreman V. F. Olson summed up performance in these tight quarters by saying, "The Tournapulls load easy in a short distance and they dump very good. The big point is that they can turn around in less than 28′ on these narrow cuts and fills." Experienced operator Warren G. Felter backs this up with: "These Tournapulls are easy to operate. They'll turn around in tight spots where other rigs won't. After being on a dozer and pan, this is like driving a Cadillac."

800′ cycle every 3½ minutes

Freezes at night, with slow daytime thawing kept haul road rutted and soft. Snow made the job very wet. Yet Tournapulls completed typical 800′ cycles every 3½ minutes. By noon of one day, each Tournapull had moved 147 loads on this 400′ haul. On a longer haul, each rig moved 117 to 132 loads per day. Combined, they averaged 2,000 pay yds. per 9-hour day over all hauls.

Prime-movers also power Rear-Dumps

For future jobs, where material is best worked by shovel loading, White Oak Excavators, Inc. plans to interchange Rear-Dump truck bodies for these Scrapers. Same LeTourneau-Westinghouse prime-movers will be used. Rear wheels, tires, brakes will be interchanged, so that contractors will have an 18-ton Rear-Dump for about 25% of the cost of a complete new unit.

You'll find LeTourneau-Westinghouse interchangeability can reduce your equipment investment. Get job-proved performance reports to prove this efficiency. Or ask us for a demonstration of the C Tournapull either with Scraper or Rear-Dump.

Tournapull—Trademark Reg. U.S. Pat.Off. P-617-H-b

Load time for 10 pay yards of rocky muck averaged just over a minute. Average load distance traveled was 150 feet.

LeTourneau-Westinghouse Company

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An International Vibro-Tamper compacts crusher-run slag laid by a Jersey spreader mounted on an Allis-Chalmers tractor. Slag was put down in two 6-inch lifts in this job of modernizing a 6.3-mile stretch of old concrete pavement near Buffalo, N. Y.

Macadam lift modernizes old concrete pavement

by FRED E. SWINEFORD, Engineer-Director, Macadam Pavements, Inc., Columbus, Ohio

The network of state highways in the area around Buffalo, N. Y., includes many miles of old concrete pavement. Extremely heavy traffic has accelerated the failure of these pavements to a degree where total destruction is imminent unless they are strengthened.

Until about six years ago, there was pretty general agreement that 2 to 3 inches of bituminous plant-mix resurfacing was sufficient to protect an old concrete pavement that had deteriorated to the point where it required strengthening. Experience has shown, however, that for roads with very heavy traffic a simple blacktopping job is not enough if the pavement has shown signs of pumping or other failure.

A typical project today includes a 3 to 4-inch course of penetration macadam or a 6 to 12-inch lift of slag or stone, plus a 2½ to 3½-inch bituminous plant-mix top placed in two layers. Only where the old pavement is in generally good structural condition—showing no signs of pumping, to be precise—is a bituminous plant-mix top alone considered sufficient.

Last summer saw modernization of a 6.3-mile stretch of Southwestern Boulevard—U. S. 20—which is a part of the Buffalo bypass just southeast of Buffalo. The modernized stretch runs from Camp Road at State Route 75 northeast to Orchard Park Road at State Route 277. The work was begun in the early spring and completed during the working season. Traffic was maintained on the road throughout the project.

The State of New York awarded a $682,523 contract for the work to Brunner Asphalt & Construction Co., Inc., Buffalo. Items included widening the old 30-foot portland-cement pavement to 36 feet in general and to greater widths at intersections, and relocation of a 1,000-foot-long curve to improve sight distance. Twelve inches of crusher-run slag and 3 inches of asphaltic concrete comprise the resurfacing.

Quantities included 75,000 tons of slag, furnished by the Buffalo Slag Co., Inc.; 310,000 gallons of emulsified asphalt, furnished by Allied Bitumens, Inc., Buffalo; and 22,750 tons of asphaltic concrete, furnished by Bituminous Products, Inc., Buffalo.

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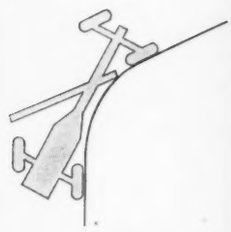
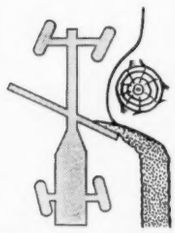
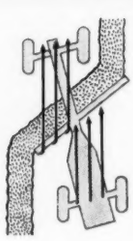
TURNING CORNERS



DODGING OBSTRUCTIONS



MOVING BIG WINDROWS



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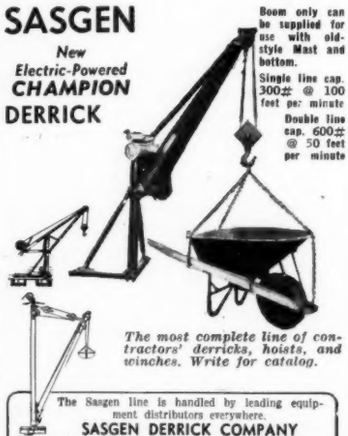

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Highway is given 12-inch course of crushed slag and topped with 3 inches of asphaltic concrete

Asphaltic concrete is compacted and leveled by a Buffalo-Springfield three-axle tandem roller. A 2-inch asphaltic-concrete binder was first placed over the slag base, and then a 1-inch asphaltic concrete wearing surface was laid.

Vitrified and corrugated metal pipe drains amounting to 4,500 feet were also an item.

Slag Sizes

The run of crusher slag for the two 6-inch lifts was sized as follows: 100 per cent passing a 4-inch-square opening; 20 to 40 per cent passing a No. 4 mesh; 0 to 10 per cent passing a 200 sieve. Blaw-Knox Apsco pavers and Jersey spreaders put down the slag. After the lower layer was compacted, it was filled with No. 1 (½-inch) slag and screenings. The top layer was rolled but not filled, and any variation was corrected with No. 2 slag to level up.

Compaction equipment included Buffalo-Springfield tandem and three-axle rollers and International Vibro-Tampers.

The upper portion of the slag lift was then penetrated with 1¼ gallons of asphaltic emulsion (federal specification RS-1), choked with No. 1 slag, and topped with ¾ to 1 gallon of emulsified asphalt choked with No. 1 slag and screenings.

The design of the 12-inch slag overlay was dictated by the necessity for keeping the road open to traffic at all times. Previously, slag lifts with only a dust-laying prime coat of bituminous material suffered excessive raveling and pot-holing from the pounding of heavy truck traffic. As a result, the surface required regrading and considerable maintenance before the next course could be laid.

With the present specifications, the slag layer is built to exact grade and anchored with a heavy penetration of bituminous material. Emulsified asphalt assures penetration of the areas containing fine material, and two applications followed by stone chipping provide a dense ravel-resistant surface.

Requirements for the finished surface of asphaltic concrete permitted no more variation than ¼ inch in 16 feet or ½ inch in 40 feet.

Asphalt Courses

The 2-inch asphaltic concrete binder was made from ⅛ to 1-inch slag with from 4 to 5.5 per cent asphalt cement. The asphaltic concrete top course was made from ½ to 200 mesh slag with from 5.8 to 7 per cent asphalt cement. The penetration of the asphalt cement was 85 to 100. Adnun and Barber-Greene blacktop pavers were used to lay these courses.

To assure a good riding surface, iron pins were set every 25 feet and each course was brought to string line grade between the pins.

Asphalt cement for this job was furnished by the Frontier Oil Co., Buffalo, and the Socony Vacuum Oil Co., Inc.

John Lang was project superintendent for Brunner Asphalt & Construction Co. Charles R. Waters, district engineer for the New York State Department of Public Works, planned and supervised the project. Clarence Wickson was project engineer.

THE END

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How much weight to a horsepower? Take one of our P&H Diesels — divide its weight by its power — and that's the figure you get.

The reason we're so proud of our baby: at 7 pounds, 6 ounces this horse is full grown! No competing diesel can produce a full horsepower to that amount of weight. Pound for pound, this engine out-powers them all.

Dollar for dollar, too. A P&H will give you more horsepower per dollar than any other diesel. And just as a sort of extra, it's also the easiest to service!

Not that it will need much servicing. Actually, a P&H Diesel takes less of it than the old gasoline engine. Its fuel cost: *about one-third.*

Some baby!

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.

THE P&H DIESEL

lowest price per horsepower . . .
lowest weight per horsepower

Piles for the docking facilities at Haines are driven into the channel bed at Lutak Inlet. This work at the receiving end of the 620-mile pipeline is being done by Marwell Construction Co., Vancouver, B. C.

U. S. Army Corps of Engineers Photo

Contractors rush pipeline for U

Work on 620-mile-long fuel line nears completion despite freezing temperatures and arctic muskeg

Fighting through arctic muskeg and frozen tundra, three joint-venture firms have, in one season, virtually completed work on the 620-mile pipeline running across Alaska from Haines, a southeastern port city, to Fairbanks.

The line, which will supply jet, aviation, and diesel fuels to military posts in Alaska, is expected to be completely tied in by early summer. Then, after required tests have been made, the multimillion-dollar facility will be put into operation in September.

The U. S.-Canadian combine doing this job under a $29 million defense contract is made up of Williams Bros. Co., Tulsa, Okla.; McLaughlin, Inc., Great Falls, Mont.; and Marwell Construction Co., Ltd. Vancouver, B. C. In addition to the pipeline itself, the project calls for the construction of a petroleum dock at Haines, pumping stations, POL storage, housing, and allied facilities. All this work is being done under the supervision of the U. S. Army Corps of Engineers.

Difficult Terrain

From its terminal at Haines, the pipeline follows the general course of the Haines highway to its juncture with the Alaska highway. Then the pipeline turns to run in a northwesterly direction to Fairbanks.

As soon as permission was obtained to run the line across Canadian boundaries, the contractors began the job of shipping thousands of tons of equipment and materials to the job site.

During last year's severe winter season, clearing operations for the 50-foot-wide right-of-way were begun. Striking out across the frozen tundra in subzero weather, crawler tractors cut across the interior of Alaska and through the Canadian Yukon to clear the way for the pipe-stringing and

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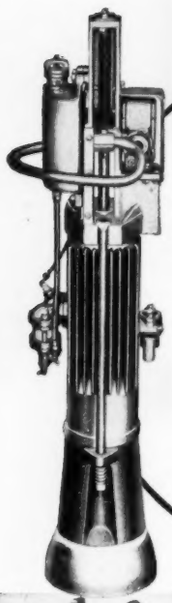

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CALWELD BUCKET TYPE EARTH DRILLS

...or U. S. bases in Alaska

A Schield-Bantam truck crane handles 8-inch steel pipe being joined at the Tanana River Bridge.
U. S. Army Corps of Engineers Photo

pipe-welding crews that follow.

Work on the pipeline began almost simultaneously at the northern end in Fairbanks and on the Canadian side of the Alaska-Yukon border, about 300 miles away. The Canadian spread worked along the general route of the Alaska Highway to Haines Junction, 100 miles north of Whitehorse, then moved along the Haines Highway to the end of the 285-mile Canadian portion of the line.

From the start, crews had difficulty laying the pipe in the frozen ground. The arctic muskeg forms a natural insulation for the ice field which is the frozen soil of this region. As heavy equipment digs through this natural insulation, the heat of the sun can turn the apparently dry area into a swamp. As a result, equipment loses traction on the solid ice bottom.

Despite warnings that ditching was impractical, the Williams firm fabricated a special ditching machine in its stateside shops to gouge a trench through 100 miles of the frozen soil. With this, and with crews working 9, 10, and 12 hours a day, the contractor was able to make the pipe-laying job move swiftly.

When completed later this year, the pipeline's terminal facilities at Haines will be supplied with fuel by oil barges plying the Inside Passage between Alaska and the northwestern states. This route is a series of inlets and waterways formed by the chain of islands lying off the western coast of Canada and southeastern Alaska. In addition to protecting barges from the violent storms which lash the Gulf of Alaska, the route will provide maximum protection against submarine action in time of war. Both the water route and the new pipeline will thus combine to insure the flow of vital fuel to Alaskan bases.

THE END

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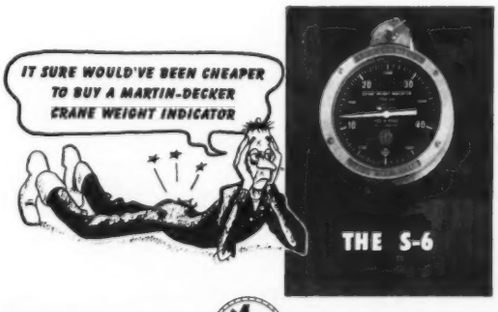

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PORTRAIT IN PRINT

He covers the waterfront

George W. Rogers—the world's greatest port is his business.

by BILL DARDEN

Eighty-five years is a long time to spend covering the waterfront—especially when that waterfront is a thriving 300-mile stretch of dock and harbor facilities serving the greatest port in the world. The Geo. W. Rogers Construction Corp. of New York City has had this "beat" since 1869, and its president feels the firm is just getting a good start.

"Covering the waterfront" means, in this case, having a substantial share in the job of building, repairing, and maintaining the many installations which accommodate the extensive shipping activity in the port of New York. It has meant watching (and helping) the harbor grow to keep pace with the city's and America's development as a power in world commerce. And—not incidentally—it means operating in a highly hazardous branch of the construction industry.

To George W. Rogers, 58-year-old president of New York City's oldest construction firm, the year just ended was one of particular significance. It marked the 85th anniversary of the founding, by his grandfather, of a marine and harbor engineering and construction concern which has done more than $100 million worth of work in the port.

Today, the Rogers firm does between $3 and $4 million worth of construction and maintenance each year in the harbor it has helped to build. And the present owner echoes the sentiments of his grandfather when he declares: "We have no desire to be the biggest. We always want to be large enough and sufficiently equipped to be efficient, but small enough to give personal attention to every job we undertake."

Hundreds of congratulatory letters received by the firm during its anniversary year testify to the fact that the Rogers company has achieved that goal. Scores of satisfied clients praised the firm for its dependability, efficiency, and cooperation. And an Award of Merit presented to George Rogers by New York Mayor Robert F. Wagner late last year cited the company for its "distinguished and outstanding contribution in marine construction and design."

Firm Grows With City

This story of a reputation built in a specialized branch of construction known for its variables and feared for its financial risks goes back some 30 years before the present owner was born. It begins in the years immediately following the Civil War. Grant was president, the electric light and telephone had yet to be invented, and New York City was a young metropolis of 1,500,000 people.

Henry M. Rogers founded the business to build new docks and piers to handle the rapidly increasing number of steam-powered passenger and freight vessels then being put into service in the New York harbor. He named the firm for his oldest son, the present owner's uncle, who was president until his death in 1914. Another uncle of the present owner headed the concern until 1925, when

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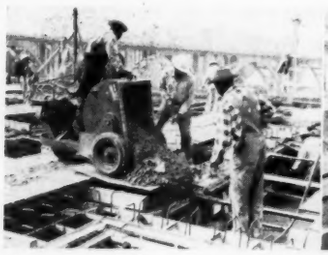

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This Gar-Bro Hopper is serving as intermediate concrete storage between bucket and carts.

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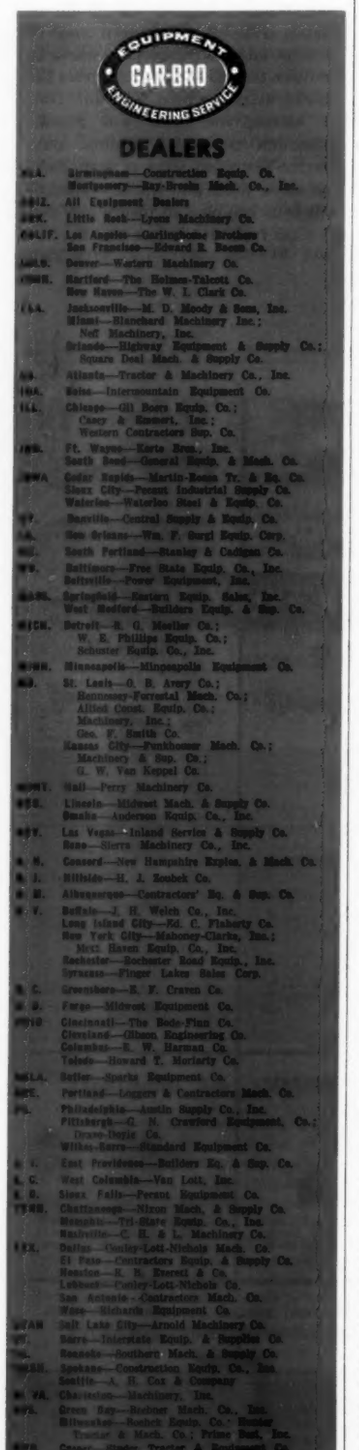

C. Aubrey Nicklas became president. Today's George Rogers took over the reins in 1938.

In the last ten years of its operation, the firm has doubled its gross volume of business. Its fleet of modern floating rigs and spread of mobile equipment are a far cry from the few machines Grandfather Rogers had to work with. And its enormous wet basin at Mariners Harbor, Staten Island, with ample room for stocks, shops, and equipment, is evidence of the sizable operations the company now undertakes. Altogether, the firm has perhaps $1,750,000 worth of equipment to do the continuing job of building and maintaining harbor facilities.

When the present George Rogers appeared on the construction scene, he was 23 years old. The year was 1919, and the Rogers firm was a thriving organization. Just out of the Navy, and with some college training at Cornell and Columbia Universities behind him, George went to work for his uncle as a timekeeper and checker. During the succeeding years he learned every phase of the business. He worked with the men in the field, and he worked with the executives in the office. In 1932 he was elected vice president, and six years later he took over as fourth president of the company.

In his years as head of this marine construction firm, George Rogers has directed almost every conceivable type of work in his specialized line—always in the face of certain financial hazards.

Any appraisal of a harbor construction firm must take into account the risks attendant on this type of work. Variables and uncertainties, present in all branches of construction, are multiplied for the contractor who drives piling—especially in harbors. The scope and extent of the work is never known until hidden conditions, particularly subaqueous ones, are brought to light.

In spite of this element of uncertainty, Rogers' firm obtains most of its work on a lump-sum or unit-price basis. But engineer-estimators can guess wrong on such factors as the length of pile needed, and the result can mean additional expense for which there is no provision in the contract. Specifically, this means that wasted pile length means wasted money, since the contractor is paid only for the length of pile actually driven.

Rogers has seen contractors come and go in this field of marine construction. Good luck, primarily, has kept the company in the clear during some difficult pile-driving operations, he says modestly. There have been losses, of course, but none large enough to be disastrous. And a wrong guess on a $1 million job could be disastrous.

Guaranteed Upset Price

Whenever possible, the firm supplements simple cost-plus by agreeing on a guaranteed upset price, and then sharing the savings on the job with the owner. This guaranteed upset price allows for the maximum expense from unknown conditions, thus protecting both the owner and the contractor against unexpected

(*Continued on next page*)

This cushioned corner which the Rogers company installed on pier 86 in the Hudson River enables the S. S. United States to dock without delay.

Why this gravel washing plant is a money-maker for the ready-mix producer

●It's a money-maker because with it, you can *produce your own* washed gravel at low cost. Here are some dollars-and-cents reasons why it will be profitable for YOU to own a PIONEER 305W plant.

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Other Important Features

Makes all the sizes you need. With the 305W, you can produce 2 sizes of rock, pea gravel or similar-size rock, and 2 sizes or grades of sand . . . all at the same time. Screens are quickly changed without seriously dismantling the plant.

Mechanical feeder supplies plant with the even, continuous flow of material necessary to maintain top production.

Drives are simple, long-lived. A V-belt transmits power to a single shaft which, through roller chains, drives 2 countershafts . . . one for screen and dehydrator, the other for feeder conveyor.

Easily portable. The 305W can be moved easily from one site to another.

Add to plant at will. It's a simple matter to insert a jaw or roll crusher in the circuit to crush the oversize and return it to the screen for separation and sizing.

For more details, write to Pioneer Engineering Works, Inc., Minneapolis 13, Minnesota (subsidiary of Poor & Company, Chicago) or your nearest PIONEER Distributor.

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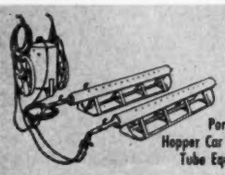

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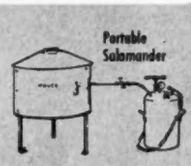

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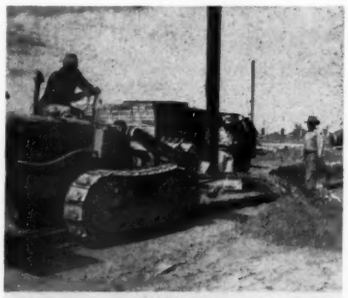

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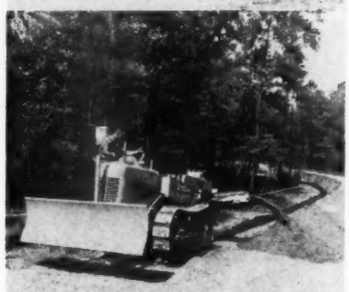

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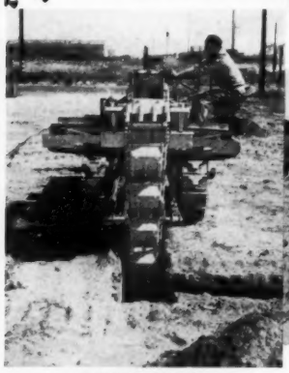

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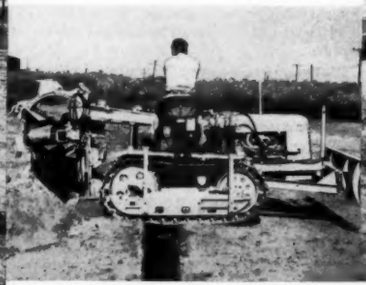

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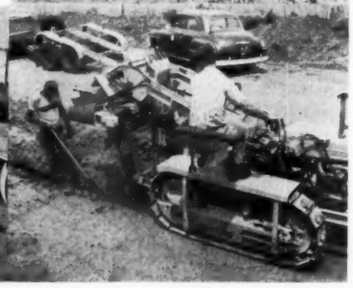


PIPE LINE STRIPPING

(*Continued from preceding page*)

costs. The plan also serves as an incentive to workmen, Rogers points out.

The way in which this modification of the cost-plus contract works may be illustrated by some figures taken from a recent job. The project involved repair work at one of the principal shipyards in the New York port. Items included the removal of old concrete deck and timber, plant rentals, field overhead, supervision, and installation of the new material.

Neither the scope nor the amount of interference could be determined beforehand. Some saving was made by using, whenever possible, good second-hand material, but this involved considerable ingenuity on the part of the contractor, as the material was difficult to locate.

The estimated cost of the project was $400,000. The increase in scope added $154,386.68 to that figure, making the total estimated cost $554,382.68. Total actual costs, however, came to only $405,276.75. Thus a saving of $149,105.93 was effected. Rogers shared in this saving, as previously agreed upon by the client.

Rogers does both big and little jobs on New York's waterfront, and his contracts vary from $500 to more than $2,500,000. The largest contract ever held by his firm was for just under $3 million and involved construction of 1,300 linear feet of bulkhead on the Harlem River in upper Manhattan.

The most difficult project he has tackled in recent years was a $250,000 (lump sum) job in which a bulkhead was built at the Bethlehem Steel Corp. plant on Staten Island. In installing steel sheet piling, Rogers' crews had to drive tie rods horizontally through an accumulation of riprap, cinders, and long-buried debris. Hammers had to be operated horizontally instead of vertically. It was a financially hazardous operation in that a wrong calculation or an impenetrable obstacle along the way could have necessitated redriving an entire rod. Fortunately, Rogers brought the job to completion without any such untoward developments, though not without worry and painstaking efforts.

Piers, docks, warehouses, sanitation dumping platforms, foundation piling for various facilities, pier sheds, and innumerable repair and maintenance jobs are entered in the record of Rogers' projects. Both industry—

represented by steamship lines, railroads, oil and coal companies, shipbuilding firms, and manufacturers—and government agencies are regular clients of this New York contractor.

The job Rogers is most proud of was a double-shift one which the firm pushed to completion in a record 43 calendar days during World War II. It involved construction of a 700-foot navy fitting-out pier for Bethlehem's shipbuilding yards on Staten Island. Rogers bid on the job on a 90-day completion date, but found after he had been awarded the contract that authorities wanted the proposed construction period cut in half. It was a test for any contractor—but Rogers met the challenge. He personally spent day and night on the job ("It nearly broke up my home") and appealed to his workers' spirit of patriotism. So successful was his appeal and his example that the firm not only completed the job within the allotted time, but also shaved two days off the 45-day period. The firm was recommended for the Navy E on the basis of that project.

A Rogers Innovation

The Rogers organization has come up with more than one new method or device in its 85 years of harbor work. One of the latest and most valuable is a special pier corner, for which patents are pending, which cushions the impact of large liners against the pier structure. The device was first installed on pier 86 in the Hudson River, where the liner United States docks. With the device, the huge vessel can dock and depart without waiting for slack water.

Against the existing role of piles, nine vertical rubber tubes 12 feet long and 12 inches in outside diameter are hung by means of galvanized steel cable. Against these vertical tubes are placed four horizontal rows of similar tubes, also anchored by steel cables, which follow the curve of the corner. Vertical oak sheathing and heavy wales just outside the rows of tubing are supported by a row of heavy spliced oak piles driven to a depth of 100 feet. These outside piles take the direct thrust of the ship and transmit it evenly to the rubber tubing and so to the pier structure.

The Rogers cushion got its real test last August 31, when Hurricane Carol struck and threw its weight around the New York harbor. Heavy gales of from 60 to 70 miles per hour and choppy water caught the United States just off the corner of her pier as the big ship was preparing to dock. Unable to make headway, the liner dropped two anchors where she was and for about an hour rocked up against the cushioned corner. There was no damage to either pier or vessel.

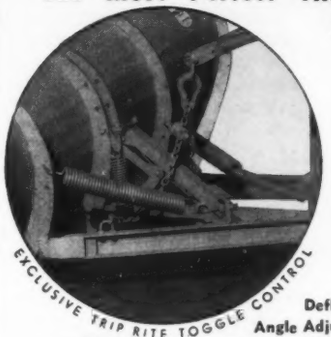
Floating equipment owned and operated by the Rogers firm includes two giant Wiley Whirley cranes mounted on steel scows (a third is on Rogers' designing board), and 18 other units such as pile drivers, derrick boats, barges, and tugs. Land equipment includes crawler cranes, auxiliary steamers, concrete mixers, compressors, and the like. Maintenance is a big item. The firm spent nearly $250,000 on repairs during 1953—an "accumulated maintenance" year.

The firm's permanent organization includes, besides Rogers and his eight-man board of directors, 15 executives, five engineers, and eight foremen. Vladimir N. Nichols, vice president and general manager, is in charge of field operations. James T. Denton is chief engineer. C. L. Chilton and F. Rogers Ketcham, the latter a nephew of George Rogers, are vice presidents and have charge of the shed construction department.

Seniority among the engineers is held by Charles O'Connor, who has been with the company since 1898. Andrew G. Johnson is the ranking foreman, having been a part of the organization since 1904. From 100 to 300 workers are employed by Rogers at a time, depending on the number of jobs under contract. The company is extremely safety conscious, and in fact is retaining a safety engineer at the present time to visit jobs and suggest ways to reduce work hazards.

(*Concluded on next page*)

The Most Perfect TRIPPING Ever Devised



The NEW DAVENPORT-FRINK ONE-WAY BLADE

TRIP-RITE SNO-PLOWS

Here's the complete answer to the trip problem—TRIP-RITE—for trucks 1½ to 5 tons. No idle tripping or chattering. Trips only when obstruction is met—safely at high speeds and with dampened shocks. Write for description. You'll be glad you did.

Trips and Rights Instantly • Included Deflector • Durable Backer Angle • Plowing Angle Adjustable • Convertible Trip to Rigid • etc.

Write TODAY for BULLETIN OW-1

DAVENPORT BESLER CORP., Davenport, Iowa

Made in Eastern U.S.A. by FRINK SNO-PLOWS, INC., 1000 Islands, CLAYTON, N. Y.

Three 4-man crews, each with a "125" compressor and two heavy breakers, formed fast-moving team.

How to break concrete in a hurry

Jaeger "125's" with 6 breakers hit top speed on U. S. Route 30

The common problem of resurfacing a heavily-traveled thoroughfare with minimum traffic delay was encountered on a section of the four-lane Lincoln Highway, Route 30, east of Pittsburgh. The first step entailed cutting out all manholes, catch basins and other utility structures and replacing with new concrete, prior to resurfacing.

To speed the work, Wilkins Construction Company used three Jaeger 125 Air-Plus Compressors behind six heavy-duty concrete breakers. The 125 cfm volume of these "new standard" compressors provided the air needed to run all six breakers at full pressure and efficiency. Each tool hit 1500 to 1600 blows a minute with an impact of 55 to 60 foot pounds, *breaking concrete up to 40% faster than had 105 ft. compressors been used.*

The Jaeger 125 is the most efficient general purpose compressor you can buy. It is built with micro-precision and engineered to produce full 125 cfm at 100 psi without racing, overheating, vibration.

The Jaeger Model 75 has the capacity to operate efficiently one heavy-duty or two light-duty breakers, which 60 ft. compressors cannot do. It has all the features of larger Jaeger compressors and provides portable power to do hundreds of small jobs at lower cost.

Jaeger Standards:	75	125	185	250	365	600
Old Standards:	60	105	160	210	315	500

For full information, ask for Catalog.

Each "125" had the air volume to hold 2 heavy-duty breakers at full pressure operation.

THE JAEGER MACHINE COMPANY

701 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • TRUCK MIXERS • LOADERS • PAVING MACHINES

(*Continued from preceding page*)

Labor relations are an important phase of the operation of a construction business, and George Rogers works hard to achieve the best possible relationship both with his men and with their locals. He admits that negotiations are "no pink tea," but he fights for what he thinks is fair and then sticks by his agreement. "Nothing irritates labor more—and justifiably so—than for a contractor to chisel on his agreements," he asserts.

Personally Speaking

A big (6-foot-plus) man with thinning hair and a determined jaw, George Rogers is an efficient combination of builder and businessman. But there is another side to this contractor. For all that he loves the water and anything to do with ships and docks, he has a bit of the farmer in him. Weekends he spends at his small farm in Connecticut, where he grows fruit and vegetables, raises chickens, and does carpentry work in his fully-equipped workshop. He brings a touch of the outdoors to the office every day in a boutonniere, but doesn't wear the posy when he visits a job. "Makes me look too much like a banker."

While studying at Columbia as a young man, Rogers spent some time in the department of journalism, and he has retained a facility with words unusual in a businessman. Two handsome souvenir books put out in 1944 and 1954 to commemorate the firm's 75th and 85th anniversaries, respectively, were written and put together entirely by the company's president. They have the professional journalist's touch.

During the week Rogers and his wife occupy their Manhattan apartment, but both look forward to the weekend "at the farm." Their two daughters are married and live with their families on Long Island. Neither son-in-law is in the construction game, so Rogers' nephew is the hope of the family as far as the business goes.

The future of the Rogers company? George denies any ambition to corner the marine construction market. In fact, he has opposed suggestions by his board that the firm set up a branch or acquire a subsidiary in another busy port. "I'm perfectly satisfied to do a good job here in the port of New York. It's the greatest harbor in the world, and we've had a hand in its growth and development. There's lots more to be done, and I think there's a good place for us in the job."

Which is no mean ambition, when you take a look at the bustling port of New York. THE END

Insurance Plan Offers Comprehensive Benefits

The Employee Protection Plan, developed by the New York Life Insurance Co., offers a wide range of benefits to personnel of companies employing from 10 to 24 people. The plan offers low-cost life insurance, as well as hospitalization, surgical, and polio benefits for the employee and his dependents. Insurance covering weekly income is also provided.

Available for architects and construction firms, the plan gives the same basic protection to employees of small companies as group insurance gives to those of large corporations.

Additional information about the plan may be secured from any one of New York Life's 164 offices or from their main office at 51 Madison Ave., New York, N. Y.

N. Y. Thruway Authority Names Special Counsel

Robert R. Prince, former counsel to the State Department of Public Works, has been appointed special counsel to the New York Thruway Authority. His predecessor, Charles S. Woolsey, has been retained by the Authority as a legal adviser, working on a contract basis.

In the legal service of the state since 1949, Mr. Prince has also served as confidential law assistant on the staff of the counsel to the governor. A native of New York City, he has been a member of the bar since 1949.

Booklet Gives Details On Transit Adjustment

■ A booklet that explains the adjustment of Gurley transits and presents helpful information on the general care of the instruments is available on request.

A section on plate levels gives directions for making the bubble-tube axes perpendicular to the vertical axis or spindle. Instructions for eliminating parallax are included, as well as details for rectifying cross-wires, collimation at distant focus, and collimation at minimum focus.

A labeled cross-sectional drawing identifies 85 parts of the Gurley transit.

To obtain this literature write to W. & L. E. Gurley, Engineering Instruments Division, Troy, N. Y., and request Service Booklet A, or use the Request Card at page 18. Circle No. 2.

How to Splice Rope

■ Information on splicing rope to secure a permanent junction stronger than any knot is contained in a reprint, available without charge, from New Bedford Cordage Co., New Bedford, Mass. The literature illustrates the fact that a good splice is not hard to make. The concern is offering contractors a reprint of a technical article with information on splicing, data on knots, and rules for rope care, safe sling loads, and safe tackle loadings.

To obtain this literature write to the company, or use the Request Card that is bound in at page 18. Circle No. 22.

170 cu. yds. per hour on 1600-ft. cycle

Tulsa contractor averages 170 cu. yds. hourly with TD-24s and B-250 INTERNATIONAL scrapers on 1600-ft. cycle while helping cut 24 per cent off length of Oklahoma highway

The D. W. Falls Construction Company of Tulsa holds the prime grading contract for 7.6 miles of Oklahoma State Route No. 20 between Hominy and Ralston. They were able to make cost-cutting short cuts in earthmoving operations on the project that cut travel distance 24 per cent by using three INTERNATIONAL TD-24 drawn B-250 scrapers moving 27 cubic yard-heaped loads, and push-loaded by a TD-24 crawler.

Take it from Supt. Bob Derington:

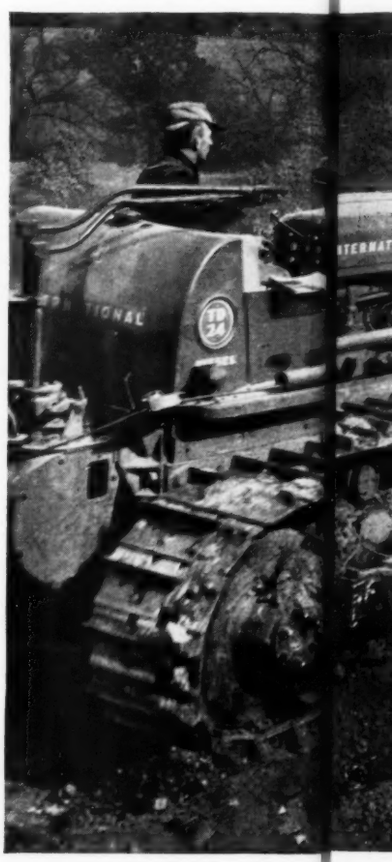
"It's really surprising how much dirt these big scrapers will move per day. Under fairly good working conditions, each unit gives me a day-after-day average of 170 cu. yds. of dirt an hour while working a 1,600-foot cycle."

You can get pay-off performance by hitching INTERNATIONAL scrapers to the TD-24—still the Champ of the crawlers with 161 drawbar horsepower. That's the kind of hook-up that loads, hauls and spreads faster than any other combination . . . day after day . . . year after year. Just call your INTERNATIONAL Industrial Power Distributor for demonstration proof. He'll bring the combination you specify anywhere, anytime so that you can see why INTERNATIONALS make every load a payload.

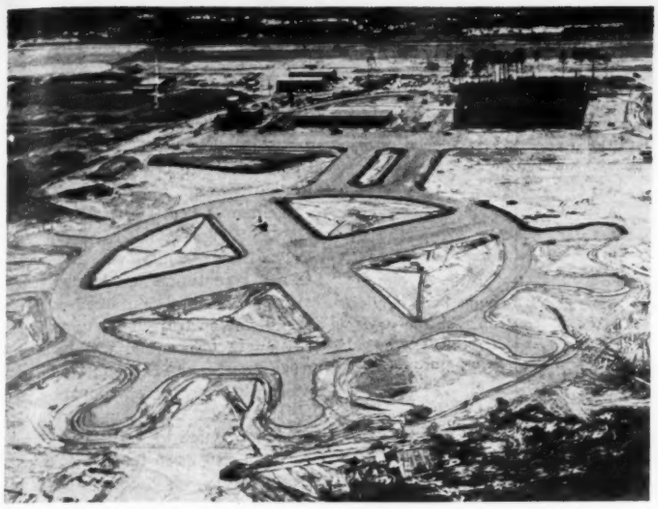
INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

INTERNATIONAL®
INDUSTRIAL POWER
MAKES EVERY LOAD A PAYLOAD

INTERNATIONAL HARVESTER



SMOOTH-WORKING TEAM. Four INTERNATIONAL TD-24 crawlers and three B-2 scrapers delivered a total of 510 cu. y hourly on the 1,600-foot cycle for D. W. Fa



New Helicopter Field Shows Design Change

An airport specifically designed for helicopters—a circular field 600 feet in diameter—was completed little more than a month ago at Fort Eustis, Va. Designed by the U. S. Army Corps of Engineers District for the army's Transportation Corps, the airport was constructed at a cost of almost one million dollars by McKoy-Helgerson Co., Greenville, S. C.

Though helicopters can take off and land at almost any site, they blast the surface with 2 million cubic feet of air per minute as they leave the ground. This creates a force strong enough to throw sticks and debris through the blades of the rotors. The new paved field is designed to lessen maintenance cost of the planes by eliminating the chance of debris damaging the craft during takeoff. Since helicopters usually land and take off at an angle for safety reasons, trees were cleared for a 2,000-foot radius around the field.

Built by the U. S. Army Corps of Engineers, this circular airfield at Fort Eustis, Va., was designed exclusively for helicopter use. The bituminous runways are expected to cut down maintenance costs of the planes.
U. S. Army Photo

The takeoff strips are 90 feet wide and 600-feet long—short runways compared to the thousands of feet required for heavier planes. Because of the light ground pressure exerted by helicopters, the strips were built with a 7½-inch subbase of selected local fill, a 6-inch base course of local materials, and a 3-inch surface course of bituminous macadam. If necessary, between 14 and 20 helicopters will be able to take off simultaneously from the field. Ten 50-foot-diameter pads, located outside the perimeter of the field to serve as maintenance areas, are joined to the circular strip by 100-foot-long and 30-foot-wide stubs.

The circular strip at the airport provides loading facilities for troops and material. A pair of 200-foot-long taxiways connect this strip with the parking area near the maintenance buildings.

A Luria prefabricated hangar 160 × 230 feet will house 20 helicopters. Nearby, a two-story combination administration building and control tower and a warehouse are fronted by a 100 × 750-foot parking apron.

Mills Petticord & Mills, Washington, D. C., and its associates, Woodard, Oliver & Smith, Norfolk, Va., designed the structures comprising the field.

TD-24 POWER FRONT AND BACK PUTS these kinds of 27 cu. yd.-heaped loads in the INTERNATIONAL B-250 scraper in a matter of seconds for D. W. Falls on the company's 7.6-mile project requiring 250,000 cu. yds. of excavation.

EASY, FAST HAULING of heaped loads is assured with this equipment combination. The B-250 scraper requires minimum drawbar pull and has a low center of gravity that gives outstanding stability on side slopes like this.

Strength Characteristics Of Eight Conveyor Belts

■ A chart and data sheet, available on request, give details on the characteristics of eight of the most popular ply and material combinations used in conveyor-belt construction. Properties covered include: theoretical ultimate strength, actual ultimate strength, fastener strength, operating strength with fasteners, operating strength with splice, and troughing index.

These properties are expressed in pounds per inch of belt width, so that total strength of a belt may be readily obtained by multiplying the figure taken from the chart by the width of the belt in inches.

To obtain this chart write to Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Tacony and Comly Sts., Philadelphia 24, Pa., or use the Request Card at page 18. Circle No. 9.

Portable Scaffold Jack

■ A catalog sheet on Waco's lightweight portable scaffold jack has been announced by Waco Mfg. Co., 3555 Wooddale Ave., Minneapolis 16, Minn. This jack is a free-standing support for scaffold planks and may be erected and adjusted easily. It features a dual-purpose head that permits use of either planks or stringers.

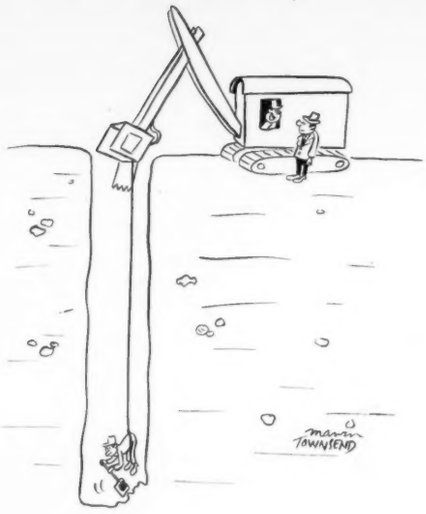
To obtain Form SJ-1754 write to the company, or use the Request Card at page 18. Circle No. 4.

Closed Circuit Television For Visual Communication Between Two Locations

■ The simplicity and functions of TV Eye, closed-circuit television equipment, is described in a folder from the Engineering Products Division, Radio Corp. of America, Front and Cooper Sts., Camden 2, N. J. The literature tells how closed-circuit television is used to achieve effective work coordination and two-way visual communication between widely separated locations.

Several applications for closed-circuit TV are outlined. Accessory equipment required for special applications, including outdoor use, is briefly described and illustrated.

To obtain Form 3R2436 write to the company, or use the Request Card at page 18. Circle No. 24.



"Of course I can only go so deep with the power shovel; that's when I call on my pardner."

Work Is Set to Start On Hampton Roads Job

Construction of the 4-mile tunnel and bridge project at Hampton Roads —the largest job yet undertaken by the Virginia State Highway Department—is set to begin under the $19 million contract awarded to Merritt-Chapman & Scott Corp., New York, N. Y.

The new facility will include a trench-type tunnel, sunk into place, and two low-level reinforced-concrete approach bridges. The underwater section of the tunnel will be about 6,860 feet long. The double-lane approach bridges, from Willoughby Spit to the South Island, and from the Hampton Shore to North Island, will be 6,110 and 3,250 feet long, respectively.

Tunnel work calls for sections of steel tube casing to be fabricated on shore, floated into position, sunk, then locked into place in a trench dug in the bottom of the river. Concrete will be placed around the tube, and this will be covered with sand. A total of 23 sections of double-shell tube casing, each 300 feet long and weighing 12,000 tons with its inner casing of concrete, will be needed for the tunnel. At its deepest point, the tube will be 113 feet below the surface of the river.

Both the tunnel and the two bridges have been designed by Parsons, Brinckerhoff, Hall & Macdonald, consulting engineers on the project.

COMPACTING EARTH FILLS

ON HIGHWAYS, AIRPORTS AND DAMS, new records are being set every day by Southwest Compaction Rollers. Here two 75-ton rollers and Cat DW21 tractors are compacting 6" to 12" lifts with only 4 to 6 passes. They are keeping pace with the largest earth-moving equipment working on 24-hour job schedules in the High Sierras.

ONE YEAR AHEAD of schedule! This record on a large earth fill dam is partially due to the improved high speed of compaction by Southwest Rollers which are used exclusively on this job.

SPEED PAYS OFF! A fleet of four 50-ton Southwest Rollers, with Cat and Le Tourneau tractors, use their weight, their kneading action of tires and extra oscillating freedom to permit faster traveling.

ADAPTORS FOR TRACTORS, most models or types, are available at Southwest. On highway and housing projects, small 20-ton Compaction Rollers can be towed by motor graders or other power equipment.

VERSATILE! Any standard 4-section Compaction Roller can be converted in a 3-, 5-, or 6-section roller. Parts for conversion are available as a complete package.

CONSTRUCTION MACHINERY DIVISION
Southwest Welding & Manufacturing Co.
ALHAMBRA, CALIFORNIA

Folder on New Line Of Contractors' Pumps

■ New literature is available on the recently announced Flomax line of self-priming centrifugal pumps. The pumps are made with a very hard seal for tough contractor service.

Models are offered in 2 and 3-inch sizes with capacities ranging from 10,980 to 15,900 gph. The mounting may be either a carrying frame, steel wheels, or rubber tires.

To obtain this literature write to Marine Products Co., 515 Lycaste Ave., Detroit 14, Mich., or use the Request Card at page 18. Circle No. 11.

Booklet Explains Features Of Shovels' Hoist Drive

■ The Magnetorque hoist drive of P&H shovels is explained simply in a new bulletin from Harnischfeger Corp., 4606 W. National Ave., Milwaukee 46, Wis.

A second section gives a schematic comparison of this mechanism with adjustable voltage systems. Also included is a comparison chart which pictures bail pull and bail speed of the different systems.

To obtain Bulletin No. X-156 write to the company, or use the Request Card at page 18. Circle No. 29.

Film on Ditcher

A 16-mm color and sound movie illustrating the features of its Model CW-4 detachable ditcher has been released by the Unimatic Corp., Tulsa, Okla. Job applications of the Unimatic-Caterpillar combination are also shown.

Showings of this 10-minute film may be arranged by contacting local Unimatic-Caterpillar dealers or the Unimatic Corp., P. O. Box 1166, Tulsa, Okla.

PRODUCT PARADE OF 1955

The construction industry expects to do $39½ billion worth of new construction in 1955, which should make this the best construction year ever. To help contractors plan for efficient and profitable operation, CONTRACTORS AND ENGINEERS presents a parade of the latest equipment and materials available at the start of the new construction season.

Powered by twin GM diesel engines that develop 380 hp, the TC-12 is Euclid's entry in the crawler tractor market for the coming season. Write to Euclid Division, General Motors Corp., Cleveland 17, Ohio, or circle 162 on card at page 18.

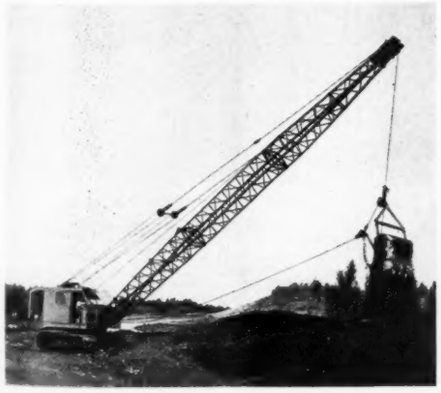
Steel segments in staggered rows around each roll direct all compaction downward on the Buffalo-Springfield Model K-45 Kompactor. Write to Buffalo-Springfield Roller Co., Springfield, Ohio or circle 165 on card at page 18.

The capacity of the LeTourneau-Westinghouse Model C rear-dump truck has been increased by 4 tons so that the earthmover now carries 22 tons. Write to LeTourneau-Westinghouse Co., Peoria, Ill., or circle 168 on card at page 18.

All-wheel drive and rear-wheel steer are among the new features of this 1-cubic-yard Michigan unit. Largest Michigan loader offered has 133-hp rating. Write to Clark Equipment Co., Benton Harbor, Mich., or circle 163 on card at page 18.

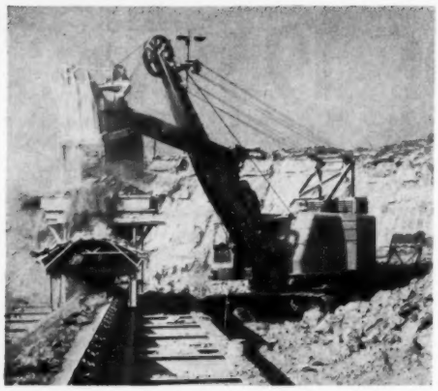
Important feature of the Galion Roll-O-Matic tandem roller is a special drive that combines a fluid coupling and a torque converter. Write to Galion Iron Works & Mfg. Co., Galion, Ohio, or circle 169 on card that is bound in at page 18.

On this tower machine for sand and gravel operations, the Crescent scraper bucket delivers 12 cubic yards on trips averaging 300 feet. Write to Sauerman Bros., 522 S. Clinton St., Chicago 7, Ill., or circle 167 on card at page 18.



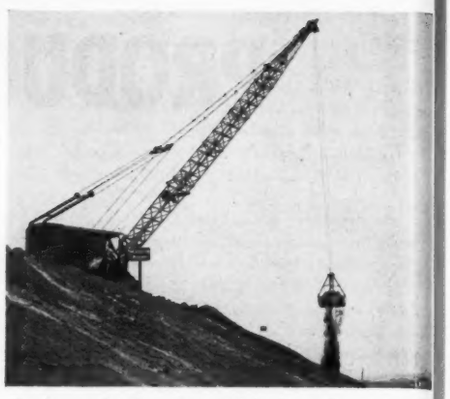
American Hoist announces that its new 1½-yard Model 750 excavator shovel is in full production. The machine is rated at 35 tons as a crane. Write to American Hoist & Derrick Co., St. Paul 1, Minn., or circle 164 on card at page 18.

The new Garrett All-Drive wheel tractor is a factory-approved conversion of an International TD-6. It is rated at 38.6 drawbar horsepower and attains speeds up to 8 mph. Write to Garrett Distributors, Enumclaw, Wash., or circle 166 on card at page 18.

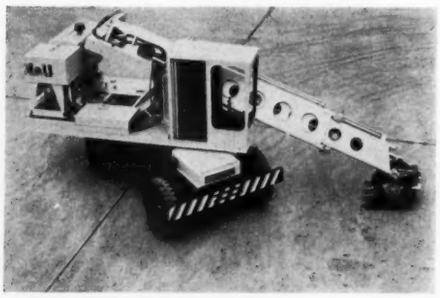


A new member of the P&H electric shovel family is introduced. This machine, identified as the P&H Model 1055-E, is similar in size to the standard 3½-yard P&H Model 1055, but is completely electric, driven by constant-speed ac motors throughout. Power transfer is through frictionless P&H Magnetorque units for all shovel motions including swing, hoist, crowd, and propel. This eliminates dc reversing motors and their accompanying motor-generator sets. Write to Harnischfeger Corp., Large Excavator Div., 4611 W. National Ave., Milwaukee 46, Wis., or circle 33 on card at page 18.

This large compressor of rotary design is the Jaeger Air-Plus 600 just announced. As compared to reciprocating compressors of similar size, this unit has 80 per cent fewer moving parts, 30 per cent less weight, vibrationless operation, and 100-degree-cooler air. Advantages also include low operating speed and simplified precision control. The unit delivers up to 600 cfm of air at exactly 100 pounds pressure. No storage receiver is needed. The flow of air is direct, continuous, and precisely regulated. Write to Jaeger Machine Co., 550 Dublin Ave., Columbus 16, Ohio, or circle 34 on card at page 18.



Casting embankment material along the approach slopes of the new Mullica River Bridge is a Manitowoc Model 2000B clamshell which is now rounding out a year of varied service at this site. Prior to the clamshell assignment, the crane was equipped as a dragline to level the slopes. The crane is shown with a 75-foot boom and a ¾-yard clamshell bucket working 50 feet above river level on the southern portion of New Jersey Garden State Parkway. For further details write to the Manitowoc Engineering Corp., S. 16th St., Manitowoc, Wis., or circle 35 on card bound in at page 18.



The multipurpose Gradall excavator is now available mounted on a new mobile and maneuverable self-propelled wagon mount. This carrier has a short wheelbase of 108 inches and a tight turning radius of 21 feet 7 inches to the right and 19 feet 10 inches to the left. Controls for operating the wagon are mounted on a panel in the cab, giving the operator instant response with a remote-control air-electric system. Top speed is 10 mph. For further details write to Gradall Division, Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio, or circle 36 on card bound in at page 18.

Portability and high production capacity are the chief features of this new Pioneer 100 to 175-tons-per-hour central hot-mix plant. This continuous-process plant, the Model 102, has only two main units. A combination dryer and dust collector and a combination gradation-mixer unit are assembled in a straight line on a single chassis. For portability, auxiliary units are all designed for ready loading and towing behind the two main units. For further details write to Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn., or circle 37 on card that is bound in at page 18.

The newest Warco motor grader is this 75-hp model powered by an International UD 350 engine. The Model 4D-75 grader has all the construction and operating features of the Warco 85 and 115-hp graders. A unique rotating saddle permits elevation of the blade to 90 degrees on either side and passage of the blade from one side to the other, without any mechanical adjustment of linkages. Hydraulic controls that are located conveniently in the cab position the blade. For further details write to W. A. Riddell Corp., Bucyrus, Ohio, or circle 38 on card that is bound in at page 18.

CIRCULATING
HOT OIL HEAT

EFFICIENT • AUTOMATIC

WE MERELY HEAT AND CIRCULATE AN OIL THROUGH PIPE OR COILS OR WHEREVER YOU ARE NOW CIRCULATING STEAM OR WATER

NO: Water or pressure, excessive heat loss, high operating cost, bulk and weight, big investment. No corrosion — No scale

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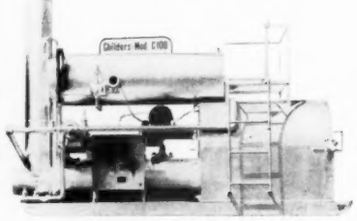
ANY PLACE USING RADIANT HEAT

4 MODELS



Model C-100 Childers
Automatic Circulating Heater

W. L. CHILDERS MFG. CO.
605 Euclid Ave., NW, Albuquerque, N. M. Phone 3-7538

THE ANSWER TO THE CONTRACTOR'S PRAYER

BREAKS CONCRETE FASTER
TAMPS BACKFILL BETTER AND FASTER FOR LESS

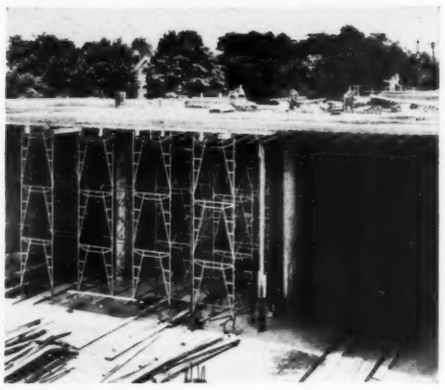
THE NEW, MORE POWERFUL
MIGHTY 1955 MIDGET

Fastest Pneumatic Concrete Breaker and Backfill Tamper. Replaces all the dirt removed after pipe has been laid.

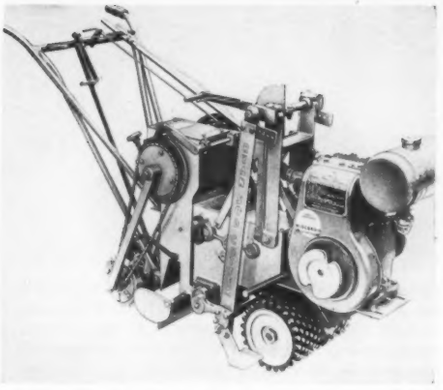
Gives you high density compaction. Ready to repave immediately. No temporary paving. No spoil dirt to haul away. Due to high density compaction, requires little asphalt in replacement. Cuts cost of tamping and breaking of concrete many times. Can be worked manually or automatically. 160' Compressor for full capacity or 105' Compressor for ½ capacity. For further particulars, see your nearest dealer, or write Department C.

R. P. B. CORPORATION
2751 East 11th Street Los Angeles 23, Calif.

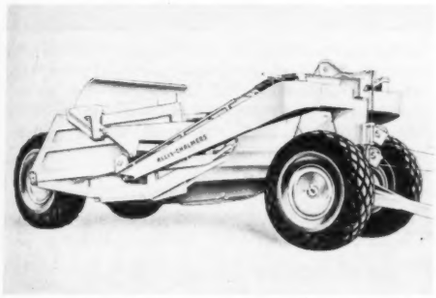
Digging power has been increased by 20 per cent and the boom and dipper stick are now made of formed plate on the new Hopto Digger Model 200 DTM-55. Also, the hydraulic cylinders that operate the machine are now safer from damage, and their inside diameter has been increased to 5 inches. The new Hopto Digger is similar to the 120 TM-54 standard truck model. Both units mount on any 1½-ton or larger truck. Other Hopto Diggers offered are crawler, trailer, and tractor-mounted units. Write to Badger Machine Co., Winona, Minn., or circle 39 on card that is bound in at page 18.



Scaffold-shoring units rolling on casters simplified shoring problems and saved forming materials on this 250 × 400-foot ceiling pour for the new Western Electric Distribution Center building in Pittsburgh. Universal Ezebilt scaffolding erected in rigid 50-foot runs raised the forms by screw jacks. When the slabs cured, the shoring was lowered 6 inches and form stripping proceeded. The scaffold-shoring units were then towed to the next pour with the forms intact. For further information on this scaffolding write to Universal Mfg. Co., Zelienople, Pa., or circle 40 on card that is bound in at page 18.



Automatic cutoff is introduced in the newest model in the Ryan line of power sod cutters. The new machine, cutting a 24-inch width, automatically cuts the sod into any desired length ranging from 4 inches to 9 feet during its regular one-man operation. All of the 1955 models feature a new transmission, giving 30 per cent faster operation and allowing the machine to be easily moved forward or backward. Models are available in 12 to 24-inch widths. For further information write to Ryan Landscaping Equipment Co., 871 Edgerton St., St. Paul 1, Minn., or circle 41 on card that is bound in at page 18.

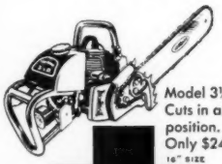


The latest pull-type scraper introduced by Allis-Chalmers is this 15-cubic-yard-struck, 19-cubic-yard-heaped-capacity four-wheel unit. The Model 315 is cable-controlled and features positive forced ejection. It makes a 9-foot 8-inch-wide cut. Over-all length of the unit is 33 feet 5 inches and the width is 11 feet 6¾ inches. The over-all height is 8 feet 8 inches with blade on the ground, and 9 feet 2 inches when bowl is raised. Clearance is 20½ inches at rear and 29 inches at front. Write to Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wis., or circle 42 on card that is bound in at page 18.

This giant front-end loader, newest Mixermobile unit, dwarfs a 1-cubic-yard loader beside it. The new Model LD20, which weighs 47,820 pounds, is available with a 4-yard bucket for conventional loading and a 10-cubic-yard bucket for light materials. Lifting capacity is 18,000 pounds. The diesel-powered unit features four-wheel planetary drive and four-wheel power steering. It also has Mixermobile's Pow-R-Flex coupling of two separate power axle elements. Write to Mixermobile Manufacturers, 8027 N. E. Killingsworth, Portland 20, Oreg., or circle 43 on card that is bound in at page 18.

The digging wheel on this Cleveland Model 240 trencher cuts up to 3 feet wide and 6 feet 3 inches deep. With a low ground-bearing pressure and good balance, the crawler-mounted unit works effectively in wet and hilly terrain. A "kick-out" clutch makes it possible to stop the crawler tracks while the digging wheel continues to operate. Also, an extra truck that supports the digging wheel entirely independent of the driving sprockets makes digging smoother. For further details on this equipment write to Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio, or circle 44 on card at page 18.

"BE FOXY . . . GET THE CHAIN SAW THAT ADDS UP"



Model 3½D Cuts in any position. Only $245.00 16" SIZE

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WELCO Self-Propelled Pneumatic ROLLER-PAK

Available in 3 sizes—9, 11 and 13 wheel

Vertical oscillation or rigid (non-oscillating).
All models three speeds, either direction.
Ford industrial engine with all modern equipment.
Variable speed mechanical steering.
Sharp turning radius.
4 and 6-ply x 8" wide smooth tires.
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Special heavy disc wheels—no spokes to twist out.
Doubly supported wheel axles.
Each wheel individually mounted for quick tire repair.
Ballast capacity 100 cubic feet and larger.
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Hydraulic brakes.
Operator's full view, all directions.
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Vertical action oscillation reduces scuffing.

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WELCO Tow-type pneumatic rollers
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WELCO Sheepfoot rollers
WELCO Powered smooth rollers 3 to 5 ton
WELCO Powered sweepers

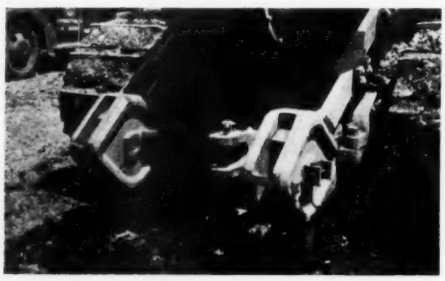
525 N. Kentucky, Oklahoma City, Okla.

Contact your dealer or write direct.

Operated by the driver from the truck cab, the Scotchman Cabomatic Model SS-5 Type C spreader features electro-hydraulic controls. A light on the push-button control panel in the cab indicates the flow of material. Write to Tarrant Mfg. Co., Saratoga Springs, N. Y., or circle 45 on card at page 18.

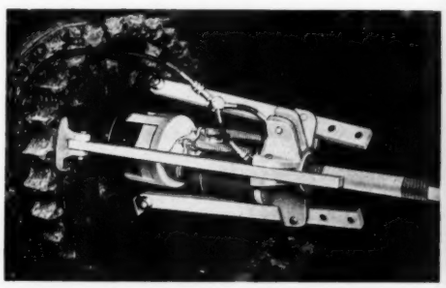
Built for heavy work, the Kelley ripper can rip ditches in laminated rock, often eliminating any shooting. The ripper mounts on the transmission case of any hydraulic or cable-operated crawler tractor. Write to Industrial Machine Co., 1546 W. Reno St., Oklahoma City, Okla., or circle 46 on card at page 18.

Settling fill around bridge abutments and backfill around foundations and in ditches are some of the jobs that the new Wayer impactor can do economically. One man handles the gasoline-powered unit. Write to Wayer Impactor, Inc., 175 Hosack St., Columbus 7, Ohio, or circle 47 on card at page 18.



Ripping in most formations, the Kritzer reversible ripper operates automatically while the tractor is in either forward or reverse motion. For further information write to Kritzer Equipment Co., Inc., 3843 W. Slauson Ave., Los Angeles 43, Calif., or circle 48 on card that is bound in at page 18.

This high-capacity snow loader has a 16-foot aluminum swivel discharge that saves truck maneuvering. Capacity of the Nelson S-11 is 20 cubic yards per minute. Write to N. P. Nelson Iron Works, Inc., 850 Bloomfield Ave., Clifton, N. J., or circle 56 on card that is bound in at page 18.



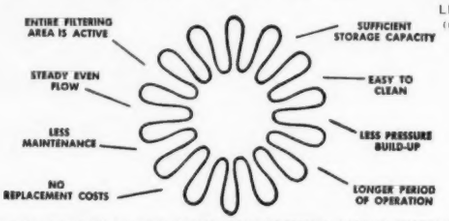
Pulling and installing the drive sprockets on crawler tractors can now be done easily and with much less labor with this new OTC 100-ton sprocket puller. For further information write to Owatonna Tool Co., 381 N. Cedar St., Owatonna, Minn., or circle 50 on card that is bound in at page 18.

WHEN YOU NEED A FILTER

Get The Advantages Of
Marvels SYNCLINAL Design
It's BALANCED For
Top Performance!

LOOK FOR THESE
IMPORTANT FEATURES

SUMP TYPE (Cutaway)



LINE TYPE (Cutaway)

FOR ALL HYDRAULIC AND OTHER LOW PRESSURE LIQUID SYSTEMS

In the selection of a filter to obtain maximum efficiency and quality, the most important to consider is a specific type filter that will offer greatest ACTIVE filtering area with ample storage capacity for filtered out particles, rather than total filtering area alone. Over 500 Original Equipment Manufacturers install Marvel Synclinal Filters as Standard Equipment because they are designed to give this all-important balance for greatest efficiency in filtration of liquids in all hydraulic and other low pressure circulating systems. Flow of liquids is maintained at a constant, steady rate of speed produced by the pump which brings about the desired effect of a gentle, evenly distributed accumulation of filtered out particles against the entire filtering surface with less restriction of flow. Result—longer periods of productive operation at minimum maintenance down-time. If this important balance is lacking due to efforts to cram too much filtering mesh for the sake of total rather than active area, filters soon become clogged causing pressure build-up, turbulent flow and in general decreases the efficiency of operating equipment. Depend on Marvel Synclinal Filters For All Your Filtration Requirements.

EASY MAINTENANCE

Both sump and line types may be easily disassembled, cleaned and reassembled by any workman, on the spot, in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connections.

WATER FILTERS

Both sump and line type filters have been adapted for use in all water filtering applications. No changes have been made in the basic, balanced synclinal design.

A SIZE FOR EVERY NEED

Available for sump or line installation in capacities from 5 to 100 G.P.M. Greater capacities may be attained by multiple installation as described in catalog. Choice of monel mesh sizes range from coarse 30 to fine 200.

FILTERS FOR NON-FLAMMABLE HYDRAULIC FLUIDS

Marvel's most recent development is a filter for the efficient filtration of all types of non-flammable hydraulic fluids.

VISIT OUR EXHIBIT Booth #807, at the Tool Engineers Western Industrial Exposition, Shrine Auditorium, Los Angeles, Cal., Week of MARCH 14

IMMEDIATE DELIVERY!

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Catalog No. 106 for Hydraulic Oils, Coolants, Lubricants
Catalog No. 300 for Water
Data on filters for non-flammable hydraulic fluids

Name ..... Title .....
Company .....
Address .....
City ..... State .....

SOIL-CEMENT PROCESSING of Mountain Highway Sets Production Record

with the Help of this

WISCONSIN HEAVY-DUTY Air-Cooled ENGINE

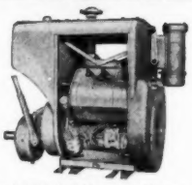
Morrison-Knudsen purchased two Seaman Trav-L-Plants, built by Seaman Motors, Inc., Milwaukee, Wis., for one-mile-a-day production of high quality soil-cement base.

Road materials pulverized, mixed, blended and correctly assembled for maximum strength and durability require accuracy in processing and precision in moisture and depth control. Cut at lower right shows Seaman method of efficient binder application and the elimination of a segregated aggregate condition by the correct assembly of coarse and fine particles.

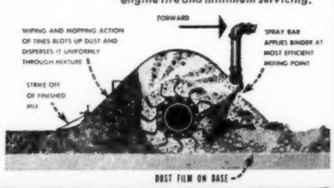
The Wisconsin engine provides a uniform flow of water or bituminous binder to the materials during mixing operation. Picture shows the Seaman in a mixing operation, preparatory to liquid application.

This is just another typical power assignment in which Wisconsin Heavy-Duty Air-Cooled Engines play important roles. Construction contractors, equipment designers and builders . . . men who are most familiar with power equipment service demands . . . specify "WISCONSIN ENGINES" as their best guarantee of dependable service and low-cost maintenance.

You can't do better than to specify "WISCONSIN" for *your* equipment. Write for Bulletin S-164.

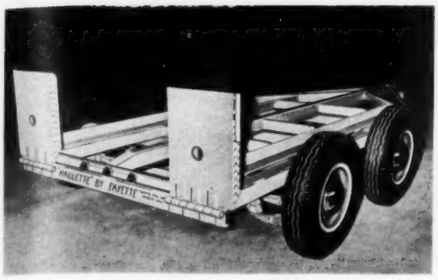


Model VG4D Wisconsin Heavy-Duty Air-Cooled Engine specified as standard equipment on Seaman Trav-L-Plant. Equipped with Stellite exhaust valves and valve seat inserts and valve rotators for long engine life and minimum servicing.

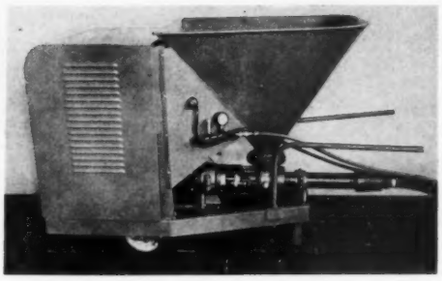

FORWARD
WIPING AND MOPPING ACTION OF TINES BLOTS UP DUST AND DISPERSES IT UNIFORMLY THROUGH MIXTURE
SPRAY BAR APPLIES BINDER AT MOST EFFICIENT MIXING POINT
STRIKE OFF OF FINISHED MIX
DUST FILM ON BASE

MOST H.P. HOURS

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN



The four-wheel tandem-model Haulette tractor trailer shown carries loads of 8,500 to 13,000 pounds, depending on tire size used. Also available is a two-wheel single-axle model with capacity up to 9,000 pounds. Write to Fayette Mfg. Co., Fayette, Ohio, or circle 51 on card at page 18.

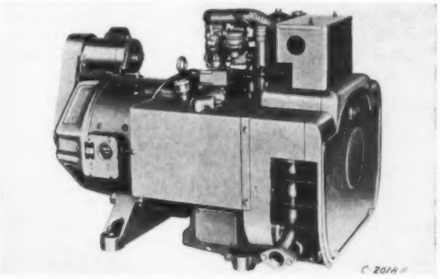


A small plastering machine, the E-Z-On Jr., is used to texture over concrete. In an Indianapolis project, 30 acres of concrete ceiling were finished with acoustical plaster without a single joining line. Write to Dept. 2, E-Z-On Corp., 1725 W. Pershing Road, Chicago 9, Ill., or circle 52 on card at page 18.

Torque-converter couplings are being used widely to give machines like this Pettibone-Mulliken Speedall 1½-yard loader a power transmission that delivers faster work cycles, with less breakage and smoother operation. Write to Fuller Mfg. Co., Kalamazoo, Mich., or circle 53 on card at page 18.

With good tractive ability, this Tracto-Lift fork truck carries roof slabs over deep mud. Large pneumatic tires and proper weight distribution make the job easier. For further information write to Tracto-Lift Co., 800 E. 18th St., Kansas City 8, Mo., or circle 54 on card that is bound in at page 18.

Designed for dirt and gravel road maintenance and to give a finer road finish, the York power grader rake follows the grader blade to redistribute, screen, and mix the road material. Write to York Modern Corp., Unadilla, N. Y., or circle 55 on card that is bound in at page 18.



Onan's new magnet generator is the Model 10CW-150R, rated at 40 amps at 250 volts dc. The Onan CW power engine used has a vacuum cooling system which expels heated air through engine exhaust. Write to D. W. Onan and Sons, Inc., Minneapolis 14, Minn., or circle 49 on card at page 18.

the pit: *tough...* 70% ROCK 30% SAND

the machine: Sauerman 2½-cu.yd. slackline cableway excavator

the result:

"..a full bucket every trip"

Another actual field report—Helena Sand & Gravel Co., of Helena, Montana, switched to this Sauerman equipment in 1946. It's been in operation since then . . . successfully performing difficult, underwater excavation of rock and colloidal sand where other equipment had failed.

Sauerman Slackline Cableways span water, bogs or pits . . . reach far, dig deep, lift and carry loads to hoppers or cone piles. However tough the pit, Sauerman equipment brings in a good load every trip.

With a Sauerman Slackline Cableway, one man—in safe position—operates a single machine . . . does the complete job, quickly, efficiently, economically! Sauerman Slackline Cableways range from 1/3 to 3 1/2 cu. yds.—span distances up to 1,000 feet . . . handle such materials as sand, gravel, clay, peat, ore and rock.

Write today for more information, including these handy field reports and catalog:

FR-216 Easy Excavating in a Tough Pit
FR-213 Cleaning Ponds Without Drzining
FR-102 Digging Gravel From a River
Catalog C Sauerman Slackline Cableways

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Heavy Handling Job Made Easy with SAFE, Dependable BRADEN WINCHES

BRADEN WINCHES ARE:

★ **SAFE:** Up to 50% more reserve pulling and holding power than ratings indicate.

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★ **GUARANTEED:** All BRADEN "M" Series Winches are guaranteed against defective workmanship & material for 1 year from date purchased.

BRADEN Truck Winches are engineered with as much care as many more complicated machines. Special alloys make them lighter but special engineering combines minimum dimensions with maximum strength.

Sure-action controls and the patented Oil-Cooled, Fully Automatic Safety Brake make the operator's job easy and safe. Longer, dependable service under the most strenuous conditions make BRADEN your best truck winch buy.

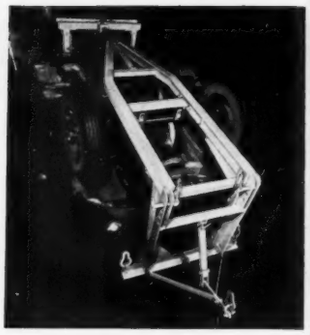
See Your BRADEN Dealer or Write for Complete Catalog

BRADEN WINCH COMPANY
P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches

A one-ton roller introduced some months ago has proved useful for compacting driveways, parking areas, and other bituminous surfaces. According to reports, contractors have also found this Model 125 Motoroller suitable for sealing larger hot-top surfaces prior to compaction by 3 to 5-ton rollers. The roller's weight range is 1,500 pounds dry to 2,500 pounds with water ballast. It is powered by an 8-hp Briggs & Stratton engine and has a forward-reverse transmission. The roller has a low center of gravity. Write to Gabb Special Products Division of E. Horton & Son Co., Windsor Locks, Conn., or circle 71 on card at page 18.

Hours and minutes of engine operation are clocked precisely by the Hobbs Engine Hour Meter. Used on gasoline and diesel-powered construction equipment, the meter is helpful in planning maintenance schedules. Write to John W. Hobbs Corp., 226 Yale Blvd., Springfield, Ill., or circle 72 on card at page 18.



Underbody hitch seen from below has three-point suspension for free pivoting. The Davenport-Frink Universal hitch is adjustable and prevents damage from excessive stress on the truck frame. Write to Davenport Besler Corp., 2305 Rockingham Road, Davenport, Iowa, or circle 73 on card at page 18.

"Baby Digger" truck loads in close quarters, has big capacity, digs up to 20" wide, 5' deep

This East Ohio Gas Company job, the replacement of a main extension, shows why the Cleveland Model 92 "Baby Digger" is so widely used for city digging. The "92" puts the edge of a trench within 17 inches of a parallel wall, loads excess spoil directly into trucks at the curb, and affords the operator full visibility of the whole job.

Its exclusive Cleveland multispeed transmission provides over 30 evenly graduated digging wheel and crawler speed combinations, from 6 inches to 30 feet per minute. Its lower wheel speeds enable it to pick its way safely through the numerous underground obstructions typical of city digging. The three lower of its four wheel speeds provide the correct power applications for digging in even the toughest soils. And its highest speed combinations, of course, assure high daily footage on jobs where high production rates can be used to advantage. It has ample capacity for trench from 10 to 20 inches wide, down to 5 feet deep.

Compactness, maneuverability, speed combinations, capacity — if most of your trenching jobs are city jobs, the "92" is *the trencher for you!*

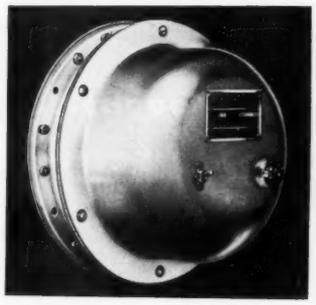
And does it get around! The "92" hustles safely from job to job . . . at legal limit speeds . . . because it's so easily portable on the drop-axle, tilt-bed Cleveland T5 Trailer.

Write for the **CLEVELAND** *Full-line Bulletin or see your Local Distributor*

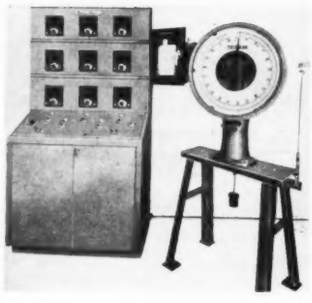
THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CLEVELAND

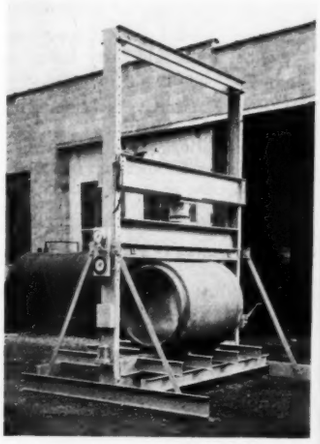
A new engine water filter is available optionally on Series "51", "71" and 6-110 Detroit Diesel engines. Through the use of mechanical filtration, inhibitors and resistor plates, the filter removes impurities from the cooling system and softens the cooling water. The filter also controls alkalinity, rust formation and electro-chemical action. Write to Detroit Diesel Engine Div., General Motors Corp., 13400 W. Outer Drive, Detroit 28, Mich., or circle 57 on card at page 18.



A built-in signal light that can be readily seen by an operator is a feature of the new Model AL Special Bin-Dicator. The level indicator is recommended for use on scale hoppers and small bins handling bulk materials. It comes ready to be connected to the user's power source. A toggle switch is provided to shut off the signal light. Write to Bin-Dicator Co., 13946-55 Kercheval, Detroit 15, Mich., or circle 58 on card at page 18.



A new electronic batching system for concrete and hot-mix industry is adaptable to either accumulative or consecutive weighing. Controls on the Thurma-tronic system may be set for one batch or for completely automatic continuous batching. In addition, controls on the versatile system may also be set to weigh any specific number of batches. Write to Thurman Machine Co., Scale Div., 156 N. Fifth St., Columbus, Ohio, or circle 59 on card at page 18.

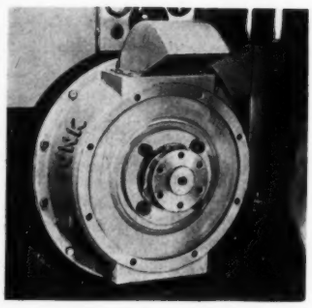


A compression tester for concrete, clay, and tile pipe with 12 to 72-inch inside diameters and lengths up to 8 feet, has been placed on the market. The new Forney machine has a ram pressure of 150,000 pounds and is built to conform to testing specifications. Its hydraulic system has a 6-inch-diameter ram with a spherical end which automatically compensates for any misalignment of the pressure beam. With a dual high and low-pressure pump provided, initial pressure can first be applied quickly with the low-pressure pump. Then the high-pressure pump is used to apply pressure at the correct testing speed. The Model PT-75 weighs about 4,000 pounds. Write to Forney's Inc., Box 310, New Castle, Pa., or circle 60 on card at page 18.

Power crowd is one of a number of important features of the torque-converter-equipped Lessmann Loadall Model GFT ¾-yard-struck loader. Other features are an all-steel welded unit frame, high lift and extended reach, and full reversing transmission. The loader has four forward and four reverse speeds ranging from 2 to 20 mph. Front-wheel drive provides stability, traction, and better flotation. Rear-wheel steering gives the unit a turning radius of 11 feet 8 inches and increases maneuverability. Write to Lessmann Mfg. Co., 2002 Easton Blvd., Des Moines 4, Iowa, or circle 74 on card that is bound in at page 18.

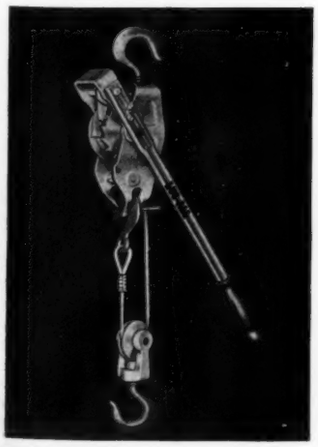
This new oil-burning heater, the Hy-Lo Model BJR salamander, has been designed especially for use where headroom is limited. It has a shorter stack and larger diffusion hood, and measures 53¾ inches in height as compared to the regular Hy-Lo salamander, which is 62¾ inches high. Write to Scheu Products Co., P. O. Box 262, Upland, Calif., or circle 75 on card at page 18.

This 15-kw ac electric plant is a gasoline-powered Kohler unit. The plant is available in six models with remote control or stand-by starting, and with varying voltage outputs. It is water cooled and equipped with a large radiator, belt-driven centrifugal pump, and blower fan. The 6-cylinder powering engine produces 51 hp at 1,800 rpm and has a 3½-inch bore and 3¾-inch stroke. Write to Kohler Co., Kohler, Wis., or circle 61 on card at page 18.



Short-coupled, for use where length is a problem, the new Funk Type C-20 torque converter is available in either a ventilated or non-ventilated model. The main body is a one-piece steel casting, machined to fit engines with SAE flywheel housings. Standard outside flanges attach to right-angle drives, transmissions, gear reductions, power takeoff hubs, or other types of drives. Write to Funk Aircraft Co., Coffeyville, Kansas, or circle 62 on card at page 18.

This multipurpose tool is the new Ingersoll-Rand air-powered Model 404 Impactool. The service tool has a ½-inch square drive and a ½-inch capacity. It converts from a nut runner into a screw driver, tapper, reamer, and wood borer with standard attachments. Features include a built-in power regulator that gives uniform graduated control, and a new improved impact mechanism. Write to Ingersoll-Rand, 11 Broadway, New York 4, N. Y., or circle 63 on card at page 18.



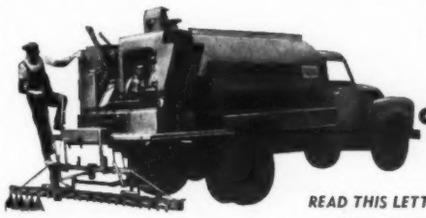
Weighing only 8¾ pounds, the Lug-All hand-operated winch hoist can handle up to 1½ tons. It will do many pulling, lifting, moving, tightening, positioning, stretching, or straightening jobs at any angle. With an interlocking pawl arrangement, loads can be backed off easily and safely. Under excessive load the safety handle bends before any other part of the hoist approaches its breaking point. The Lug-All is available in three models with variations in cable size, cable length handled, and capacity. On the largest model, the 3000-HD, pull or lift is 5 feet at the 1½-ton rating or 10 feet with the quickly-set-up double-speed ¾-ton rating. Write to Lug-All Co., Wynnewood 16, Pa., or circle 64 on card at page 18.

To say that we are well pleased with our

ROSCO DISTRIBUTOR

would be stating it mildly!

Ed M. Knott, Asst. City Eng. Muscatine, Iowa



"One of the Best Pieces of City-Owned Equipment"

READ THIS LETTER **from Ed M. Knott of Muscatine:**

"Early in the summer of 1951 the City Council of Muscatine purchased a Rosco 1000 gallon capacity Distributor and mounted it on a 1½ ton truck. To say that we are well pleased with our Rosco Distributor would be stating it mildly.

"We started our extensive road program last year and our Rosco was in constant use every day it was possible to work. We seal-coated 150 blocks of City Streets and in addition to this, constructed 36 blocks of road mix asphalt, besides oiling nearly 100 blocks of City Streets.

"During all this time we had only one minor breakdown on our Rosco which was taken care of in less than 2 hours time by our own mechanics.

"All of this work was done directly under my supervision and I feel well qualified to praise our Rosco as one of the best pieces of equipment owned by the City of Muscatine and we own nearly $150,000 worth of street construction equipment of all makes.

"This year we are planning another heavy schedule of street improvements and when we start in a few weeks I entertain no fears as to what our Rosco will and can do for us."

- **Uniform application through exclusive Pressure Metering**
- **Use any length of Spraybar without changing pressure**
- **Accurate, non-clogging, no-streak Vee-Jet Nozzles**

Ask your dealer, or write Rosco for the full story of the Bituminous Distributor with "P.M."—the Pressure Metering Method.

ROSCO-PACTOR

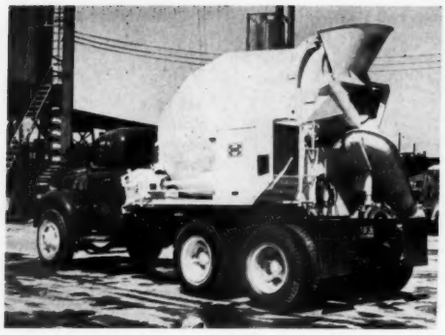
Latest design compaction roller provides positive lap between front and rear tread. 9 and 13 wheel models.

Rosco MINNEAPOLIS

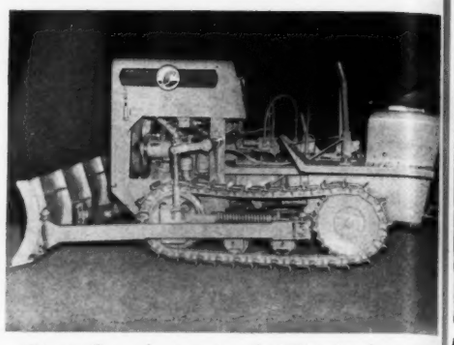
3118 SNELLING AVENUE • MINNEAPOLIS 6, MINNESOTA

DISTRIBUTORS • MAINTAINERS • BROOMS
SUPPLY TANKS • TAR KETTLES • STREET FLUSHERS

Blackhawk rear-mounted blades for 2, 3, and 4-plow tractors equipped with a three-point-hitch system are now offered in standard and heavy-duty models. Both types of utility blades feature a wide choice of angular positions and pitch adjustments. Accessories include side plates and skid shoes for snow removal, and a gage wheel attachment. Write to Arps Corp., New Holstein, Wis., or circle 79 on card at page 18.

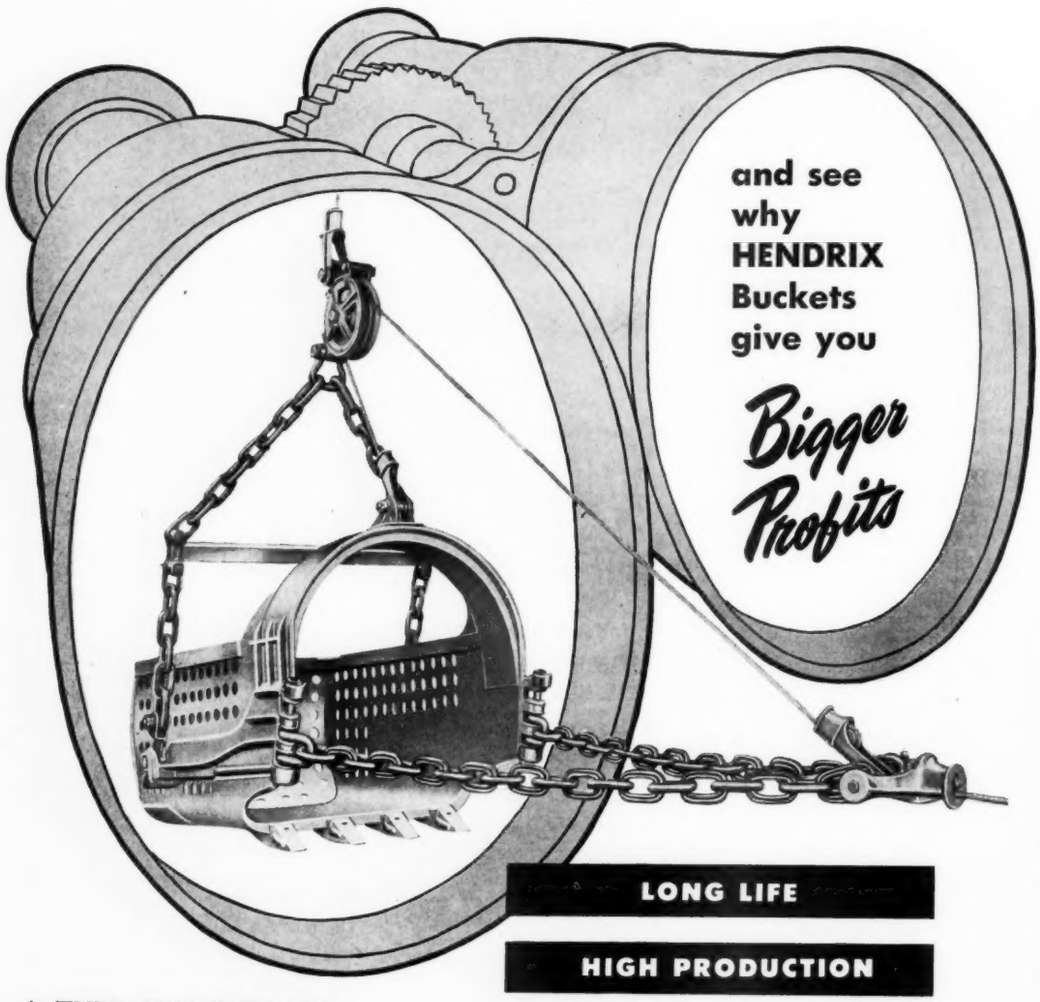


This 4½-cubic-yard truck mixer and agitator is the third of the Blaw-Knox Series M Hi-Boy mixers designed for mounting on short-wheelbase trucks. Other models are 5½ and 6½-cubic-yard units. All are guaranteed by the manufacturer to mix ½ cubic yard more than normal rating. Write to Blaw-Knox Co., Blaw-Knox Equipment Division, Pittsburgh 38, Pa., or circle 78 on card at page 18.



This small crawler tractor, only 103 inches long with moldboard and A-frame, is equipped with a 46-inch-wide tilting and angling dozer blade. Available now in a new model, the Mity Kat is recommended for light excavation and grading, roadbuilding and maintenance, and snow removal. Write to Mity Kat Tractor Corp., 211 Corporation Way, Medford 55, Mass., or circle 77 on card at poge 18.

take a *closer* look



LONG LIFE

HIGH PRODUCTION

LOW-COST MAINTENANCE

A TYPE AND SIZE FOR EVERY DIGGING PURPOSE

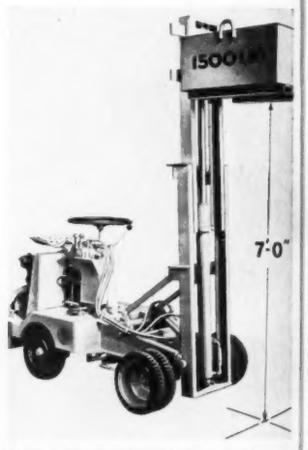
¼ to 40 Cubic Yards

Hendrix Lightweight Dragline Buckets

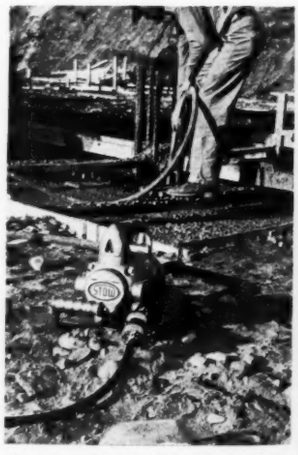
Hendrix Buckets available without perforations

HENDRIX MANUFACTURING CO., Inc.

MANSFIELD, LOUISIANA

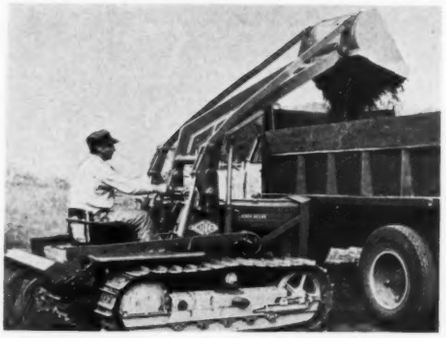


A fork-lift attachment for the Model R-15 Kwik-Mix Moto-Bug has been announced. The new hydraulic unit is rated to lift a ¾-ton load to a height of 7 feet in 14 seconds. Also available for the Moto-Bug are a hopper body with a 15-cubic-foot capacity and a flatbed platform that carries a 2,000-pound load. Write to Kwik-Mix Co., Milwaukee 16, Wis., or circle 68 on card at page 18.



This new electric vibrator, the Stow Model BU, will run at 9,000 vibrations per minute while developing 2 horsepower under load. A high-speed ball-bearing motor, skid mounting, and lifting handles are features. A ⅜-inch flexible shaft that can be combined to lengths up to 35 feet, and a 2½-inch Model 2500 vibrator head are supplied. Write to Stow Mfg. Co., 443 State St., Binghamton, N. Y., or circle 69 on card at page 18.

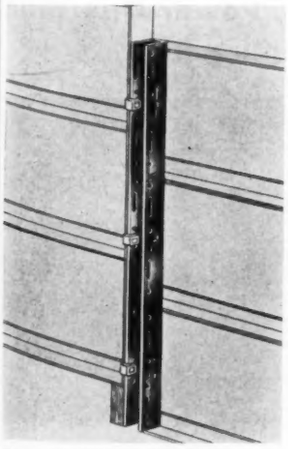
Made of Alcoa aluminum, this dump-truck body is said to be almost 50 per cent lighter than conventional units, yet equal in strength. It is available in lengths of 12 to 22 feet for capacities from 10 to 25 cubic yards. Weight savings range from 1,800 to 3,000 pounds. Low maintenance cost is a further advantage. Write to Penn Body Div., Hockensmith Corp., Penn, Pa., or circle 76 on card at page 18.



This tractor-loader team is made up of the new ½-yard Ateco loader mounted on the John Deere 40-C tractor. The unit has a 7-foot 11-inch dump clearance and a 2-foot 6-inch-high reach. A scarifier, a ¾-yard snow bucket, and a 66-inch bulldozer-backfiller blade attachment are available for the machine. Write to the Greenville Steel Car Co., Greenville, Pa., or circle 65 on card at page 18.

Heavy-duty rock rippers like this Wadsworth are designed to rip the toughest rocks even under frost conditions. Penetrating to a depth of 5 feet, the Wadsworth rock rippers are used in right-of-way cutting and on road cuts, as well as for ditching and pipeline work. They are made for both hydraulic and cable equipment. Write to Wadsworth Mfg. Co., Irving, Texas, or circle 70 on card at page 18.

Paving contractors faced with the problem of locating manhole covers and valve caps that have been accidentally covered will appreciate the help of the Goldak Model 620-M box and valve locator. This electronic locating instrument, operated by one man, can survey large areas quickly. Write to Goldak Co., 1544 W. Glenoaks Blvd., Glendale 1, Calif., or circle 66 on card that is bound in at page 18.



Concrete forming flexibility is offered by the new Uni-Form dual-purpose step filler form. This is a prefabricated form that members with Uni-Form concrete forms and can be used as a regular filler or step filler. It allows continuous forming regardless of footing conditions. Write to Universal Form Clamp Co., 1236-38 N. Kostner Ave., Chicago 51, Ill., or circle 67 on card that is bound in at page 18.

"The right wire rope? That's EASY every time!"

IT'S A CINCH to pick the right wire rope for top performance in excavating and construction . . . and it pays off! Roebling's new catalog has a section devoted to rope for the excavating and construction field . . . shows at a glance the best rope for each purpose and gives you a simple, unique code number ordering system which for the first time in wire rope history *positively* identifies the desired rope.

Write for your copy of the new "Roebling Wire Rope Recommendations and Catalog". And remember that the Roebling Field Man at your nearest Roebling office or distributor is always available to help find the answer to special wire rope problems.

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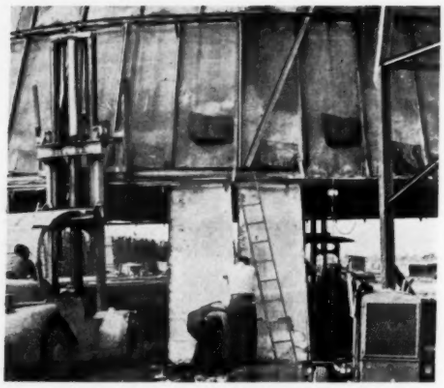
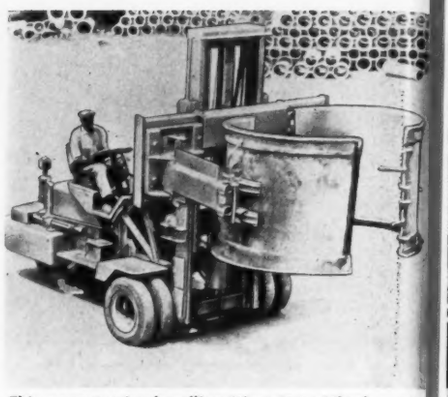
BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

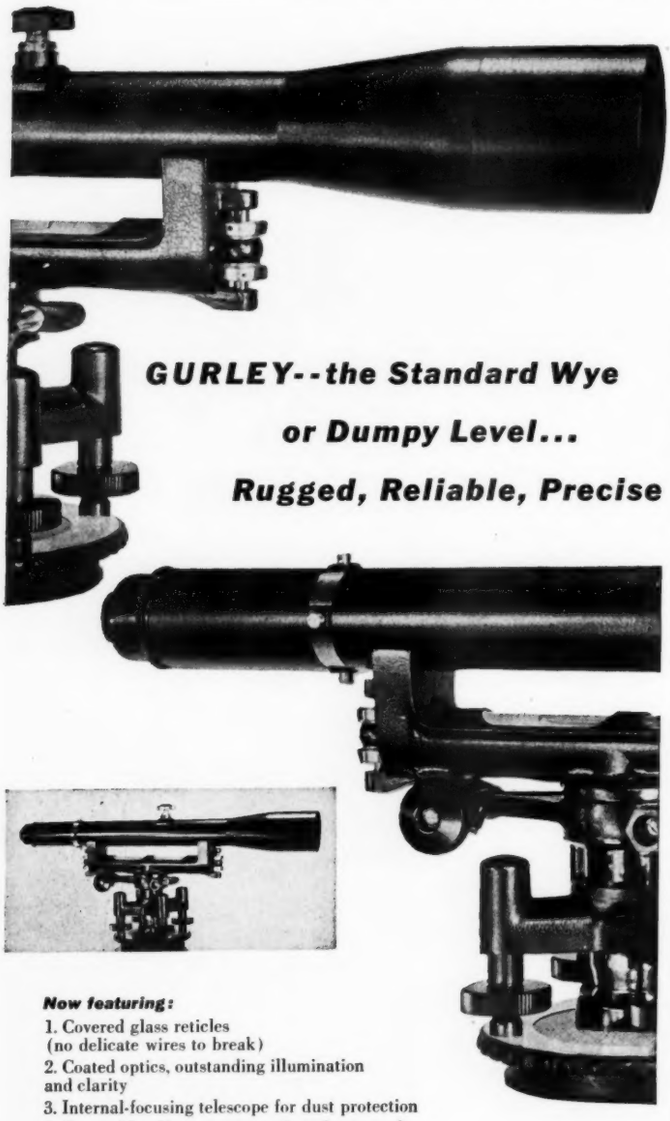


By employing four Hyster 150 lift trucks, this contractor raised a 60 × 60-foot burner structure 10 feet, to double its capacity. Write to Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg., or circle 81 on card that is bound in at page 18.

Echelon spreading of salt, cinder, sand, and calcium chloride for ice-control work is the feature of the new Model J Highway spreader. Write to Highway Equipment Co., Inc., 616 D Ave. N. W., Cedar Rapids, Iowa, or circle 84 on card at page 18.



This concrete-pipe-handling Silent Hoist Liftruk carries pipe up to 96 inches in diameter and weighing up to 15 tons. The load can be shifted four ways. Write to Silent Hoist & Crane Co., Inc., 841-877 63rd St., Brooklyn, N. Y., or circle 85 on card at page 18.



GURLEY--the Standard Wye or Dumpy Level... Rugged, Reliable, Precise

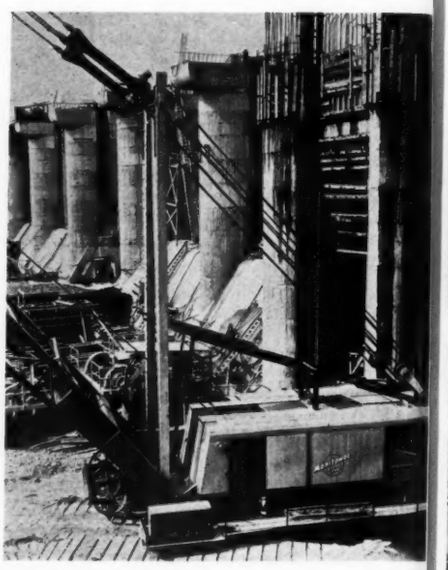
Now featuring:

1. Covered glass reticles (no delicate wires to break)
2. Coated optics, outstanding illumination and clarity
3. Internal-focusing telescope for dust protection
4. Covered leveling screws, no threads exposed
5. Leaf-type tangent springs: smooth-acting, unaffected by dust and dirt
6. Tangent screws impinge on agate bearings

Made in 18" Wye or Dumpy models with rigid tripod and mahogany carrying case.

Plus Variable Power, now standard on all Gurley transits and levels, permits wide range of magnification with *one* eyepiece. Change your magnification to suit weather and light conditions. Built-in haze filter. Write for "Facts on VP."

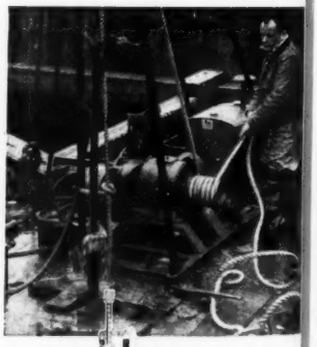
GURLEY *W. & L. E. Gurley, Fulton & Station Streets, Troy, New York*
Established 1845



Rud-o-Matic Thomas automatic boom stops provided a vital safety factor on this difficult job tackled by C. J. Montag & Sons and McNutt Bros., Oreg. Working on the Dexter Dam near Eugene, the contractors decided to precast huge spillway bridge sections and tainter gates on the ground. When lifting sections into place, they equipped their Manitowoc 100-ton crane with Rud-o-Matic Thomas boom stops to keep booms from being raised too high, preventing costly accidents. These boom stops are built in three sizes. Model 5,000 is for use with small cranes, M-10,000 is for cranes of 20 to 100-ton capacity, and M-15,000 is for cranes with extra-long booms. Write to McCaffrey-Ruddock Tagline Corp., 2131 E. 25th St., Los Angeles, Calif., or circle 80 on card at page 18.

acker **Portable, Power Operated Soil Sampling Rigs**

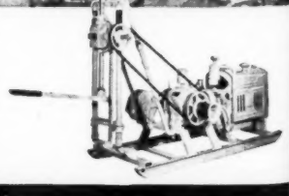
Acker power operated soil sampling rigs combine into a compact, portable unit a standard power plant together with powerful hoisting winch and pump. Two models are available — Acker Model RGT for light duty and Acker RG for heavy duty service. These relatively inexpensive units are ideal for soil sampling, jetting and driving pipes or piles.



More for Your Money!

Add an *Acker rotary drill head* for rock coring and foundation test boring.

The Acker Model SK rotary drill head when combined with Acker RGT and RG rigs make an ideal unit for rock coring and foundation test boring. For complete information, write today for bulletin 28-C&E.



ACKER DRILL CO., INC.
725 W. Lackawanna Avenue
Scranton, Penna.

A complete line of Soil Sampling Tools, Diamond and Shot Core Drills, Drilling Accessories and Equipment.

An Insley Type K backhoe works on Indianapolis' Weir-Cook airport. The unit is shown excavating on a new terminal project, part of a $7 million improvement program. Write to Insley Mfg. Corp., Box 167, Indianapolis 6, Ind., or circle 86 on card at page 18.

Track removal and salvage job improving downtown Minneapolis is speeded by a Minneapolis-Moline Wheeler unit with more than four tons of lifting capacity. Write to Minneapolis-Moline Co., Minneapolis 1, Minn., or circle 87 on card at page 18.

New asphalt-road repair unit, the Cartwright Pavette, delivers from a half shovelful to a wheelbarrow load of heated and proportioned mix. Write to Cartwright Industries, Box 3251, S. Highland Station, Birmingham, Ala., or circle 88 on card at page 18.

The stonepicker illustrated will clear stone from 1½ to 8 inches in diameter. The Pixtone can also be adapted to pick 1-inch stone in soil and ¾-inch stone in sand. Write to Bridgeport Implement Works, Inc., 1483 Stratford Ave., Stratford, Conn., or circle 82 on card at page 18.

A new concrete placer, the Prehy Type R, has a capacity of 6 cubic feet and handles concrete mixes containing 1-inch aggregate through a 3-inch discharge line. The machine has an internal by-pass and agitator, a pressure gage, pressure relief valve, and control valve. It places materials at pressures from 10 to 125 psi. Only 58 inches high, the unit fits conveniently under a transit-mix truck. Write to Prehy Co., 420 Lexington Ave., New York 17, N. Y., or circle 83 on card at page 18.

Here's how the Mogel Construction Company provided safe, portable heat for their millwork shop in Wisconsin. A Herman Nelson Portable Heater spotted heat right where it was needed, anywhere in the shop.

Why does Herman Nelson outsell all other portable air heaters?

Because: indoors or outdoors, Herman Nelson Portable Air Heaters are best for any job.

HERE ARE THE FACTS! Complete safety indoors . . . clean, fume-free, heated air in the working area, with all dangerous gases vented outside!

Maximum efficiency outdoors . . . with flexible canvas ducts channeling heat right to the spot where you need it!

More than 30,000 Herman Nelson Portable Heaters are in use today. Whether you buy, rent, or lease, you'll get the best deal if you see your Herman Nelson Distributor first. FLEET OPERATORS: Ask about our Fleet Users' Replacement-Leasing Plan . . . learn the *extra* advantages in standardizing on Herman Nelson!

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Best Known Name In

PORTABLE AIR HEATERS

DIVISION OF AMERICAN AIR FILTER CO., INC.
MOLINE, ILLINOIS

FREE! MONTHLY WEATHER FORECASTING SERVICE Better than 85% accurate over the past three years!

HERMAN NELSON
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Dept. 34, Moline, Illinois

Please send me your monthly weather forecast chart, with no cost or obligation to myself.

☐ We are in the market for a portable air heater. ☐ We are not in the market, but would like information for our files.

NAME_____

COMPANY_____

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-CONVEYORS-

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BRICK — TILE — CONCRETE

SALES

SERVICE

— LIGHTWEIGHT — RIGID —

GASOLINE, AIR, OR ELECTRIC DRIVE

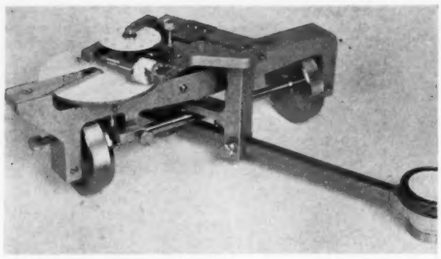
Write for Bulletins—B.C., F.T., or S.M.

FARNCO SALES CO.

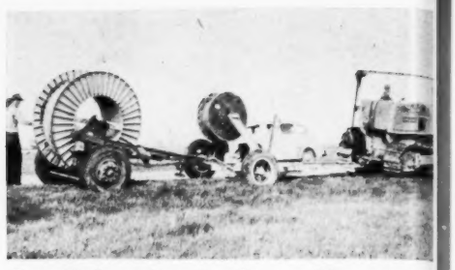
Emerson 2-3614

6715 Formosa Way Pittsburgh 8, Pa.

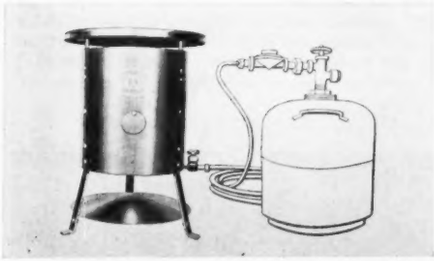
A high-pressure cleaner, the new Malsbary Model 250, removes dirt and grease from a D4 Caterpillar tractor. Note compact spray and absence of fog. Write to Malsbary Mfg. Co., 845 92nd Ave., Oakland 3, Calif., or circle 89 on card at page 18.



This planimeter for the accurate evaluation of areas on maps, drawings, and charts is one of a variety of surveying and drafting instruments imported by the Geo-Optic Co., Inc., 170 Broadway, N. Y. 38, N. Y. Circle 90 on card at page 18.

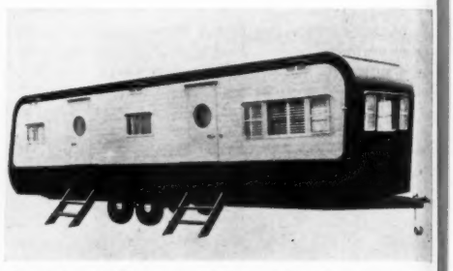


The cable layer shown is a Ryan, and has a cutting blade with teeth that hold down in soil without the need for extra weight. The machine is available with depths of cut of 36 to 42 inches. Write to F. B. Ryan, Chariton, Iowa, or circle 91 on card at page 18.

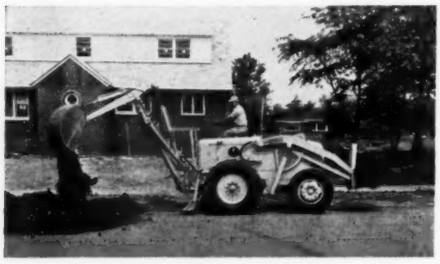


This new Jackson salamander is an LP gas-fired unit. It features a dual-purpose shield that deflects heat along the floor, and an inside baffle for efficient heat flow. Write to Jackson Mfg. Co., Harrisburg, Pa., or circle 92 on card at page 18.

The heavy-duty hydraulic ripper mounted on the Allis-Chalmers HD-15 tractor is the new Tractomotive TR-15. Penetration of the new ripper is up to 20 inches. Write to Tractomotive Corp., Deerfield, Ill., or circle 93 on card at page 18.



Attractive trailers come fully equipped to serve as field offices. This 35-foot-long International trailer pictured is also available in 30, 28, and 23-foot lengths. Write to International Trailer Co., Inc., Baltimore 5, Md., or circle 94 on card at page 18.

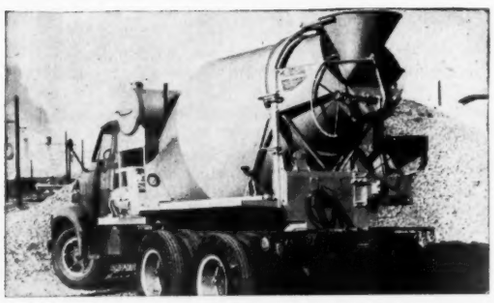


A new long-reach hydraulic backhoe has been designed for the Hough Payloader Models HE and HF. The Wain-Roy backhoe has a swing radius up to 190 degrees and features a wrist-action bucket. Write to Wain-Roy Corp., Hubbardston, Mass., or circle 95 on card at page 18.

A new line of telescopic hoists and matching dump bodies features forward mounting of the cylinders. The Galion Duo-scopic models carry 1,500 pounds extra payload without exceeding rear-axle weight limits. Write to Galion Allsteel Body Co., Galion, Ohio, or circle 96 on card at page 18.

This new bituminous paver-finisher made by the Foote Construction Division of the Blaw-Knox Co. is reported to lay blacktop at an average speed of 54 feet per minute. Features include dual hydraulic controls. Write to Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa., or circle 97 on card at page 18.

TRANSCRETE AVAILABLE IN 3 TO 6 YARD CAPACITIES



CMC's Transcrete — the simplest truck mixer of all — features the famous "Thoro-Mix" action that charges, mixes, and discharges all slumps faster.

Large drum diameter, deep "L" section blades and a progressively increasing blade slope are drum design features that make for more thorough mixing, more positive discharge. and a greater ability to handle stiff, low slump mixes.

Transcrete's time saving efficiency means more trips per day as mixer or agitator.

Quality construction and simplified rugged design assure trouble-free life.

Transcrete offers you the choice of a profit making size at the price you want to pay.

CMC OFFERS LARGE VARIETY OF BATCHING EQUIPMENT

CMC's Multiplex Bins fill a long apparent need for a more compact, lower-in-height bin for central plants and many other installations.

They are available in unit construction 16' square — 2, 3 or 4 compartment, 110 or 165 ton, with or without 125 or 175 bbl. center cement compartment, elevator or conveyor.

Interchangeable legs and braces make ground assembly quick, easy. They can be erected in just a fraction of the time usually required.

Batchers are available in 1, 2, 3, 4 or 6 yard sizes with or without cement compartment.

Other Outstanding Batching Equipment

CMC also has Bin Batchers for smaller jobs; cement bins, cement batchers, manual or automatic; automatic water weighers; conveyors and elevators to fit into your present plant.

SOLD & SERVICED BY AMERICA'S BEST DISTRIBUTORS

CONSTRUCTION MACHINERY COMPANIES . . . . . WATERLOO, IOWA

For your concrete forming needs...

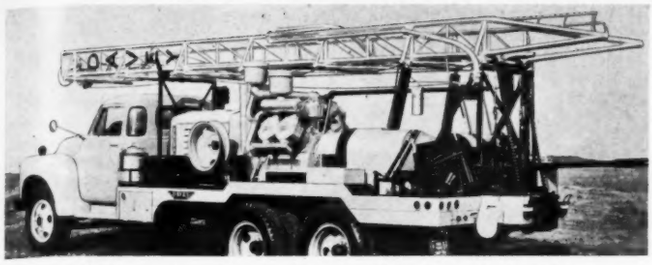
EFCO "LIFETIME" STEEL FORMS

available on a **PURCHASE BASIS**

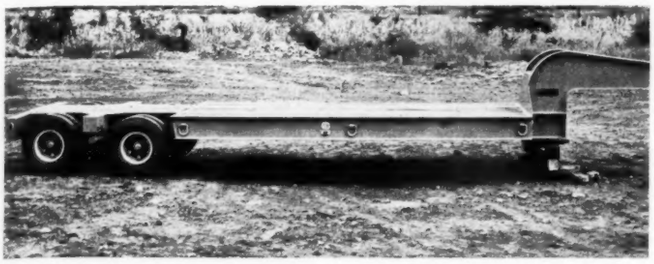
Increase profits, reduce costs — with EFCO "Lifetime" Steel Forms. They save time, material, money. Adaptable to wide use. Available in many types of regular and special sizes.

WRITE FOR NEW CATALOG on EFCO "Lifetime" Steel Forms. And ask for details on Special Economy Steel Forms and the Economy Steel Form System on a rental basis.

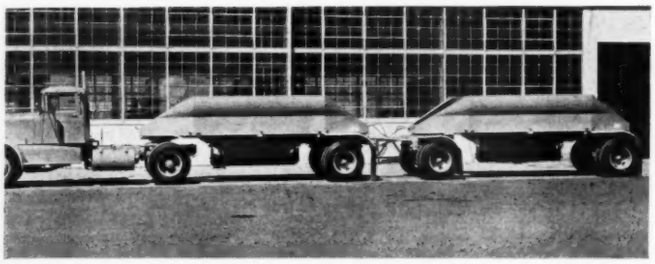
ECONOMY FORMS CORP.
HOME OFFICE • DES MOINES, IOWA
DISTRICT SALES OFFICES: St. Louis, Mo. • Kansas City, Mo. • Lincoln, Nebr. • Minneapolis, Minn. • Ft. Wayne, Ind. • Cincinnati, Ohio • Cleveland, Ohio • Metuchen, N. J. • Springfield, Mass. • Rochester, N. Y. • Washington, D. C. Decatur, Ga. • Dallas, Texas • Los Angeles, Calif. Oakland, Calif. • Denver, Colo.



This rotary drill is a new and improved version of the Davey Model M-8A. The unit, which uses both compressed air and high-pressure water for drilling, has a rated capacity of 6¼-inch holes up to 300 feet with air and to 1,000 feet with water. The compressor for air-blast drilling is a Davey unit. A GM engine powers the machine. Write to Davey Compressor Co., Kent, Ohio, or circle 98 on card at page 18.



Recent addition to the Fontaine line of trailers is this new Model ZP machinery trailer, designed for heavy-duty hauling. Special features offered at no extra cost include I. C. C. lights and reflectors, turning signals, air brakes, and lashing rings on the sides and rear. Write to Fontaine Truck Equipment Co., Inc., P. O. Drawer 1591, Birmingham, Ala., or circle 100 on card at page 18.



All-welded high-tensile steel construction and frameless design give the new Gar Wood bottom-dump hopper bodies structural strength with minimum weight. The unit illustrated is the Model 270-0-20, a 20-cubic-yard-capacity train. Hopper bodies are about 20 feet long, and have a capacity of 10 cubic yards. They are designed for hauling sand, aggregate, and cement. Write to Gar Wood Industries, Inc., Richmond Division, Richmond, Calif., or circle 99 on card at page 18.

This simple structure constructed of Armco Multi-Plate pipe arch is a T-shaped explosion shelter that holds 30 people. The 40-foot tunnel-type shelter consists of elliptical sections with central adits covered with fill and situated to minimize danger from blast. Overhead clearance is 105 inches. Floors are concrete. Write to Armco Drainage & Metal Products, Inc., 703 Curtis St., Middletown, Ohio, or circle 160 on card at page 18.

PORTABLE INSTO-GAS

INSTO-HOT SALAMANDERS

PATENTS APPLIED FOR

FLOOR-TYPE OR CYLINDER-MOUNTED

ACCLAIMED BY USERS FOR THEIR EXTRAORDINARY PERFORMANCE

The portability of Insto-Hot Salamanders makes it possible to have heat any place WHERE and WHEN you want it—They burn with a clean blue flame without smoke or monoxide fumes. Proven in use for over two years.

Illustration shows the No. 1405 Insto-Hot Salamander mounted on the new, unique "35" Insto-Gas Cylinder. This large capacity cylinder was engineered for stability, portability and long time operation. It provides twice the burning time of smaller portable cylinders and is an exclusive product of Insto-Gas.

The No. 1410 Floor-type Salamander is attached by hose to the cylinder, no pressure regulators required for either model. Insto-Hot Salamanders have engineered heat deflection (patents pending) with capacities up to 150,000 Btu per hour.

Write TODAY for complete information:

INSTO-GAS CORPORATION • DETROIT 7, MICHIGAN

In Canada: W. H. CUNNINGHAM & HILL LTD., Toronto 2, Canada

SEND THIS COUPON FOR FREE FOLDERS

INSTO-GAS CORPORATION, Detroit 7, Michigan C & Eng.
Send me facts on Insto-Hot Salamanders and New "35" Cylinder.

NAME_____

ADDRESS_____

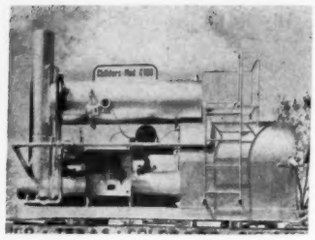
Smooth!

. . . We're talking about the finish our new Stow G-34 and E-34 Roto Trowels deliver on any paving job!

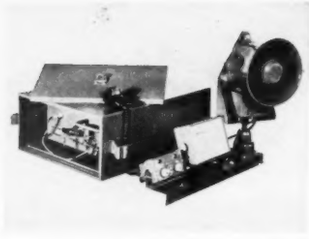
We've some interesting figures on performance for you, too!

Write today for complete information on STOW Roto-Trowels.

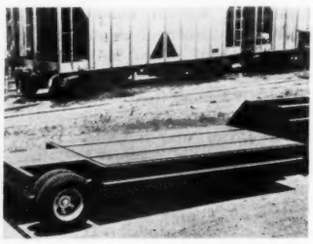
STOW MANUFACTURING CO.,
40 SHEAR STREET, BINGHAMTON, NEW YORK



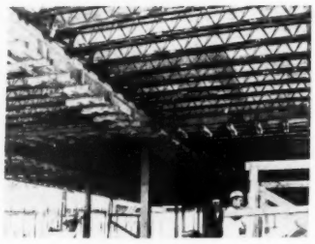
Four models of Childers oil heaters for asphalt plants offer heating capacities ranging from 15,000 to 150,000 gallons. The Model C-100 shown heats up to 150 tons of asphalt per hour. Write to W. L. Childers Mfg. Co., 605 Euclid Ave. N. W., Albuquerque, N. Mex., or circle 101 on card at page 18.



Extra power to overcome high audible noise levels is a characteristic of this new Motorola two-way radio system. The radio is recommended for use in vehicles. Write to Motorola Communications & Electronics, Inc., 4501 W. Augusta Blvd., Chicago 51, Ill., or circle 103 on card at page 18.



This is the new Model Z Birmingham trailer, which has a 15-ton capacity. The unit, which will handle practically any machine the average contractor operates, is now available. Write to Birmingham Mfg. Co., Inc., 1101-29 S. Second Ave., Birmingham, Ala., or circle 102 on card at page 18.



Special lightweight girders are shown supporting forms for concrete construction. The re-usable Hico girders span 29 feet without support. They come in 2, 3, and 4-foot sections, and adjustable end sections. Write to Webrib Steel Corp., 120 Broadway, New York 5, N. Y., or circle 104 on card at page 18.

Spreads 400 tons of road base per hour

. . . with help of 100 TIMKEN® bearings

THE Blaw-Knox Model P-150 Base Paver shown below can spread road base material of all kinds, ranging in size from dust to 5 inches, at a rate that averages up to 6½ tons a minute.

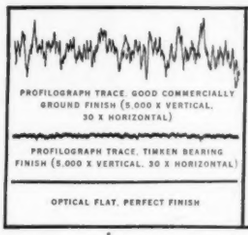
The 100 Timken® bearings used on the P-150 are one of the main reasons this 12-ton machine operates smoothly and without breakdowns. Timken bearings practically eliminate friction. For two reasons: a tapered design that is geometrically correct to produce true rolling motion, the answer to friction; and manufacture that lives up to the design. We even make our own steel. It's the only way we can be sure it's good enough for Timken bearings. We're the only U. S. bearing maker that does.

One Timken bearing application in this machine illustrates several of the reasons Blaw-Knox uses so many. Timken bearings on the eccentric that oscillates the screed take severe radial and thrust loads. Because of their tapered design, Timken bearings can take any combination of radial and thrust loads. And they take heavy, rapid shock loads—because rollers and races are case-hardened to provide a hard, wear-resistant surface over a tough, shock-resistant core. Timken bearings require little lubrication, minimum maintenance, because they keep shafts and housings concentric, make closures more effective. Lubricant stays in and dirt out.

All these advantages and more are yours when you specify the bearings with the trade-mark "Timken". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

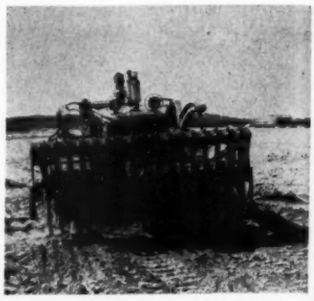
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS


PROFILOGRAPH TRACE, GOOD COMMERCIALLY GROUND FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
PROFILOGRAPH TRACE, TIMKEN BEARING FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)
OPTICAL FLAT, PERFECT FINISH

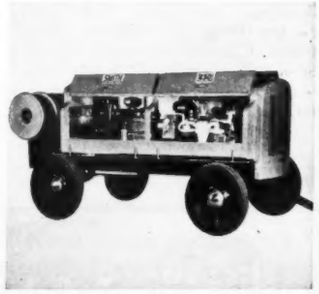
SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

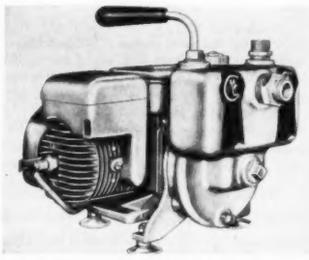
NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →◎←



The adaptability of the Rockland heavy-duty land-clearing rake is shown on this job, for which eight teeth were added to the unit's standard nine. After small debris was cleared, the extra teeth were removed to permit larger spacing. Write to Rockland Allied Equipment Corp., Harborside Park, Providence 5, R. I., or circle 105 on card at page 18.

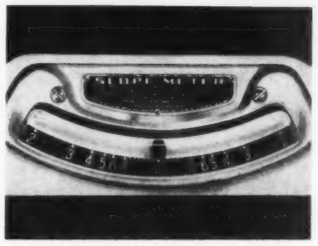


Largest portable model yet offered in the Smith compressor line is the new Model 230-P. This is a single-stage compressor rated at 230 cubic feet per minute. A 6-cylinder Chrysler engine powers the unit, which can power four 80-pound paving breakers. Write to Gordon Smith & Co., Bowling Green, Ky., or circle 106 on card at page 18.



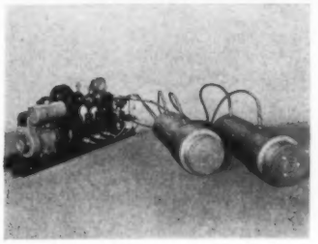
A little pump that weighs only 27 pounds is the latest addition to the Construction Machinery line of centrifugal pumps. Write to Construction Machinery Co., Waterloo, Iowa, or circle 115 on card at page 18.

Disk harrows are being used increasingly by road contractors to break up lumps of soil, scarify compacted earth, and aerate wet material. The Rome heavy-duty disk shown is a veteran of Ohio Turnpike construction. Write to Rome Plow Co., Cedartown, Ga., or circle 108 on card at page 18.



The Slope-Meter, installed on a motor grader, will accurately and continuously indicate the slope of the ground that the machine is grading. This enables the operator to construct true slopes without waves. Two new companion instruments being planned will give the slope in per cent of grade and in degrees. Write to Slope-Meter Co., Excelsior, Minn., or circle 110 on card that is bound in at page 18.

Equipped with a triple platform for masons, tenders, and materials, Morgen's adjustable scaffolding moves up mechanically with the job. The scaffolding is available in 12 and 19-foot heights for the construction of walls as high as 22 feet. Write to Morgen Mfg. Co., Yankton, S. Dak., or circle 109 on card at page 18.

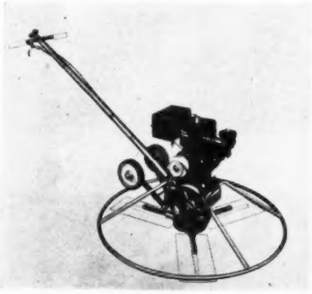


A new series of Richard Dudgeon jacks includes models with capacities ranging from 50 to 400 tons and with strokes up to 48 inches. Intended primarily for jacking large-diameter steel and concrete pipe, these jacks are designed for 6,000 psi pressure at capacity. Write to Richard Dudgeon, Inc., 789 Bergen St., Brooklyn 38, N. Y., or circle 111 on card at page 18.

The new Thor triplex tamper No. 366-T has an air swivel connection attached to the air manifold to provide even distribution of air. Write to Thor Power Tool Co., Aurora, Ill., or circle 132 on card at page 18.

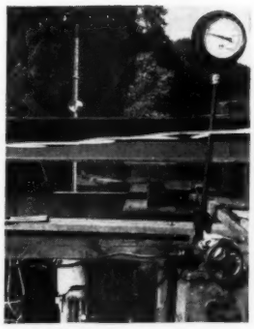
PENNSYLVANIA TURNPIKE

DELAWARE EXTENSION TO PENNSYLVANIA TURNPIKE



Retractable wheels for easy moving are a feature of the Champion concrete finisher. Other features are a clutch that engages smoothly, remote controls, and a safety throttle release that idles the engine. Write to Champion Mfg. Co., 2028 Washington Ave., St. Louis 3, Mo., or circle 113 on card at page 18.

Monotube Piles FOR TURNPIKE AND THRUWAY CONSTRUCTION...WHERE SPEED AND ECONOMY COUNT



OHIO TURNPIKE

TURNER TURNPIKE, OKLAHOMA

NEW YORK THRUWAY

NEW JERSEY TURNPIKE

TAPERED and fluted Monotube piles—used in turnpike construction since the inception of such projects—offer *big* advantages that mean *big* savings.

Monotubes save time and money because of simplified on-the-job weld splicing, easy extendibility, quick cut-offs and minimum waste. Light mobile driving equipment is all that's required to drive lightweight Monotubes quickly and easily to any required depth.

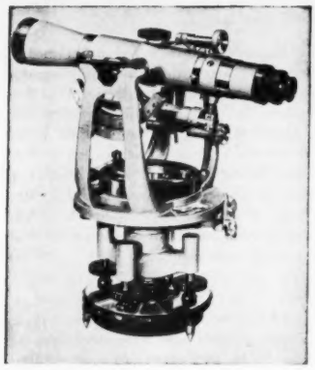
Monotubes, cold-rolled for added strength, are recognized for their exceptional load bearing capacity. This, plus top-to-bottom visual inspection before concreting, means heavier loads with fewer piles. Also, with Monotubes there's a choice of gauge, taper, diameter or length . . . for varying soil conditions.

Before starting that next foundation job, find out how you can save with Monotube piles . . . without sacrificing strength or sound construction. Write today to The Union Metal Manufacturing Company, Canton 5, Ohio, for Catalog No. 81.

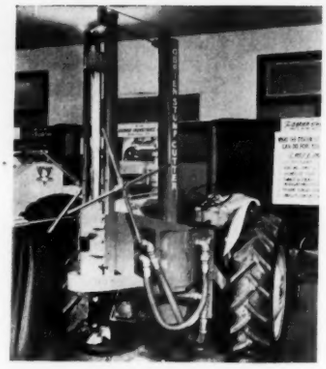
UNION METAL

Monotube Foundation Piles

Steel forms are now available from the Economy Forms Corp. on a purchase basis, to supplement the concern's rental service. Write to Economy Forms Corp., P. O. Box 128, H. P. Station, Des Moines, Iowa, or circle 116 on card at page 18.



Although lower in cost the new Warren-Knight transit-level operates like a transit, but adjusts like a wye level. Write to Warren-Knight Co., Dept. 1, 136 N. 12th St., Philadelphia 7, Pa., or circle 117 on card at page 18.

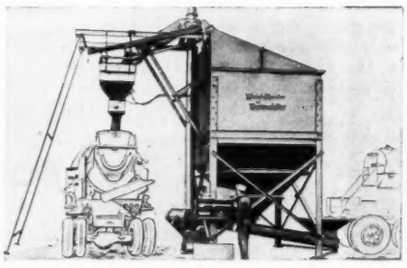


This tractor-mounted O'Brien stump cutter cuts down stumps of any diameter to 8 inches below ground level. Write to Metal Parts Machining Corp., Watervliet, N. Y., or circle 118 on card bound in at page 18.

This 29-pound chain saw that cuts quickly through hard, soft, wet, or frozen wood, is powered by a 3½-brake-hp gasoline engine. Cutting bar for the Mall 1 MG chain saw comes in 5 sizes: 18, 24, 30, 36, and 42 inches. Write to Mall Tool Co., 7740 S. Chicago Ave., Chicago 19, Ill., or circle 119 on card at page 18.

Now in production are two new heavy-duty Shawnee loaders — the Special for smaller tractors, illustrated at right, and the Loadmaster for larger tractors. The loaders have been designed basically for Fordson Major and Ford and Ferguson tractors. Write to Shawnee Mfg. Co., Inc., 1947 N. Topeka Blvd., Topeka, Kans., or circle 120 on card at page 18.

A wide-base version of the Schield Bantam ⅜-cubic-yard crawler-mounted excavator-crane has been announced. The model C-35 can straddle ditches, working directly over them instead of along their sides. Write to Schield Bantam Co., Waverly, Iowa, or circle 121 on card at page 18.



Bulk cement unloaded into the ground-level feeder hopper is augered through the vertical screw lift to the batcher on this new WeighMeister. Surplus material is automatically diverted to the storage bin. Write to L. Burmeister Co., 4535 W. Mitchell St., Milwaukee, Wis., or circle 122 on card at page 18.

WHEN and WHERE you need

SUCTION HOSE

Call for "*RIGHT NOW*" delivery—any size—1½" through 10"—from a nearby Continental Warehouse

You can bank on fast delivery whenever you call *any* Continental Warehouse. They *all* carry big stocks of Suction Hose . . . many of them have both 8" and 10", ready to put on the road the minute you call.

You have no profit-eating delays while waiting for long distance shipments . . . no need to tie up your own working capital in costly inventories.

So the next time you need Suction Hose, or any other hose*, call or wire your nearest Continental Warehouse. You'll like the service you get.

HOSE by (CR) **CONTINENTAL**

*A complete line for Contractors: Air, Water, Steam, Suction, Discharge and Pile Driver Hose. Protective Clothing, Boots and Gloves. Send for latest catalog.

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DETROIT 27, Mich. 13801 Schoolcraft Ave.
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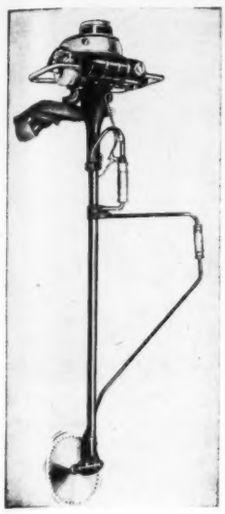
For the Hard Jobs...

Omaha Dragline Buckets are built to take on the toughest of digging jobs. Rugged, extra-strength construction, their higher arch, their wedge shape, their continuous lip — mean that Omaha Buckets are built for work. Available in four types. Write today for complete catalog giving description and specifications.

OMAHA DRAGLINE BUCKETS

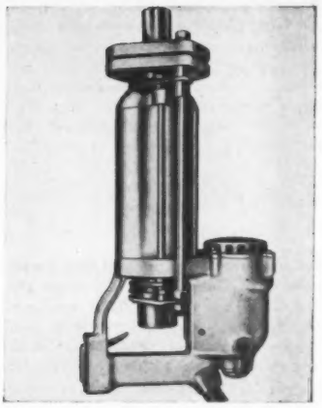
DRAKE-WILLIAMS MOUNT • OMAHA, NEBR.



The Brushking, shown at left, is a lightweight version of the Brushmaster brush-cutting power saw. Write to Brushmaster Saw, Keene, N. H., or circle 124 on card at page 18.

Now available to industry is the compact Super Power hoist, at right, developed by Coffing for the Army. An efficiency of 75 per cent is reported. Write to Coffing Hoist Co., Danville, Ill., or circle 125 on card at page 18.

This trucker's snatch block has a new type of safe-locking threaded-bolt pin. Write to LeBus Rotary Tool Works, Longview, Texas, or circle 126 on card at page 18.



New Syntron electromagnetic hammer drill has drilling capacity of 3-inch diameter. Write to Syntron Co., 227 Lexington Ave., Homer City, Pa., or circle 127 on card at page 18.

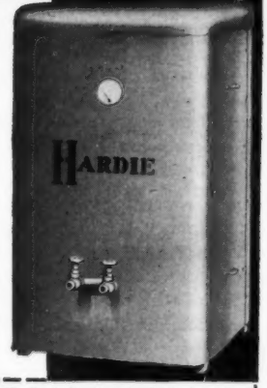
Two new gasoline-powered concrete saws have been announced by Clipper Mfg. Co. The new cutters are the 25-hp Model C-250 and the 14.6-hp Model C-146. Both saws are designed for continuous work, and are available optionally as self-propelled saws. Write to Clipper Mfg. Co., Suite 635, 2800 Warwick, Kansas City 8, Mo., or circle 128 on card at page 18.

Neo-Flasher barricade light units are now available for rental in all principal cities. Write to Light Products, Inc., Dept. R, 407-c Commercial Center St., Beverly Hills, Calif., or circle 123 on card at page 18.

QUICK, EASY, LOW-COST CLEANING of ALL HEAVY EQUIPMENT UNITS

- **A solid, driving, high pressure stream that strips the caked mud, grease and dirt from vehicles, machines and all other equipment.**
- **A high pressure spray that licks the dust, dirt and grime from any surface.**
- **A fine fog mist that dissolves the dirt from fragile things and places.**

These you get from a Hardie High Pressure fully enclosed pump and motor unit, available in capacities from 5 gpm at 300 psi to 24 gpm at 400 psi. Pump and motor units up to 60 gpm at 800 psi for all liquids, chemicals and semi-liquid materials. Enclosed models provide easy accessibility to operating parts. All Hardie pumps are trouble-free, rugged, vertical piston-type pumps that work to their ratings smoothly, quietly, at slow speed.



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DEPENDABLE EQUIPMENT
SOLD AND SERVICED ALL OVER THE WORLD

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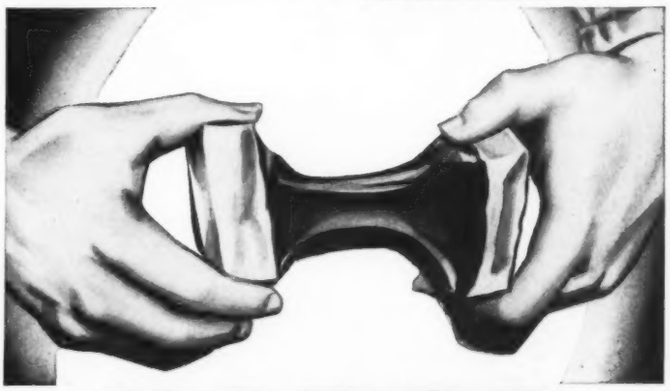
City_____ State_____

NOW! The easiest to handle Joint-Sealing Compound is also the BEST!



KAPCO
RUBBER ASPHALT JOINT SEALER

☆ BETTER ADHESION!
☆ WATERPROOF!
☆ EXPANSIBLE TO WITHSTAND BOTH EXTREME HEAT AND COLD!

Kapco Rubber Asphalt Joint-Sealing Compound, manufactured in Keystone's modern Chicago Heights plant, meets Fed. Spec. SS-S-164 (supersedes Fed. Spec. SS-F-336a), also C.A.A. Spec. P-605 and all State Highway Dept. Specs. for this type of seal. It comes in 50# strippable bags designed for full protection and ease of handling.

Order separately or in combination with other KAPCO products which include famous Kapco Tongue and Groove Joint, Kapco Fibre or Fibreglas Expansion Joint, Kapco Concrete Curing Compound, etc., etc.

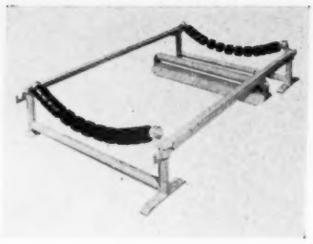
For your own convenience, why not order all of your asphalt road-building materials from one source!

WE GUARANTEE PROMPT SERVICE!

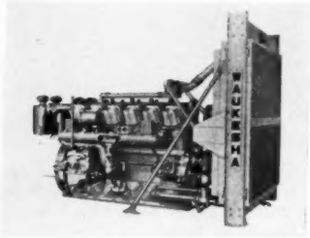
KAP
KEYSTONE ASPHALT PRODUCTS COMPANY
DIVISION OF AMERICAN-MARIETTA COMPANY

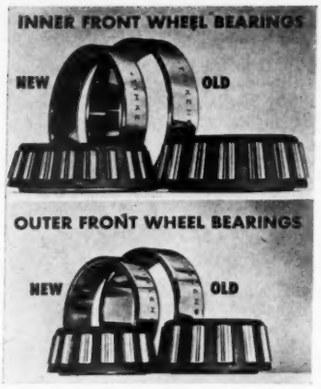
Product Parade

This cable-suspension idler consists of resilient neoprene disks molded to a neoprene-sheathed flexible steel cable. The Joy Limberoller permits easy assembly, moving, and storage of conveyor sections. Write to Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa., or circle 129 on card at page 18.

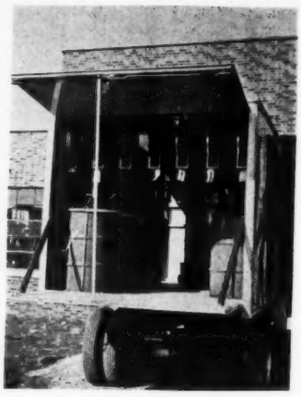


For uses requiring up to 1,000 horsepower, Waukesha Motor Co. offers the new 12-cylinder Model VLR power unit. This engine is available for use with propane-butane or natural gas fuel, and as a full diesel. Write to Waukesha Motor Co., Waukesha, Wis., or circle 130 on card at page 18.





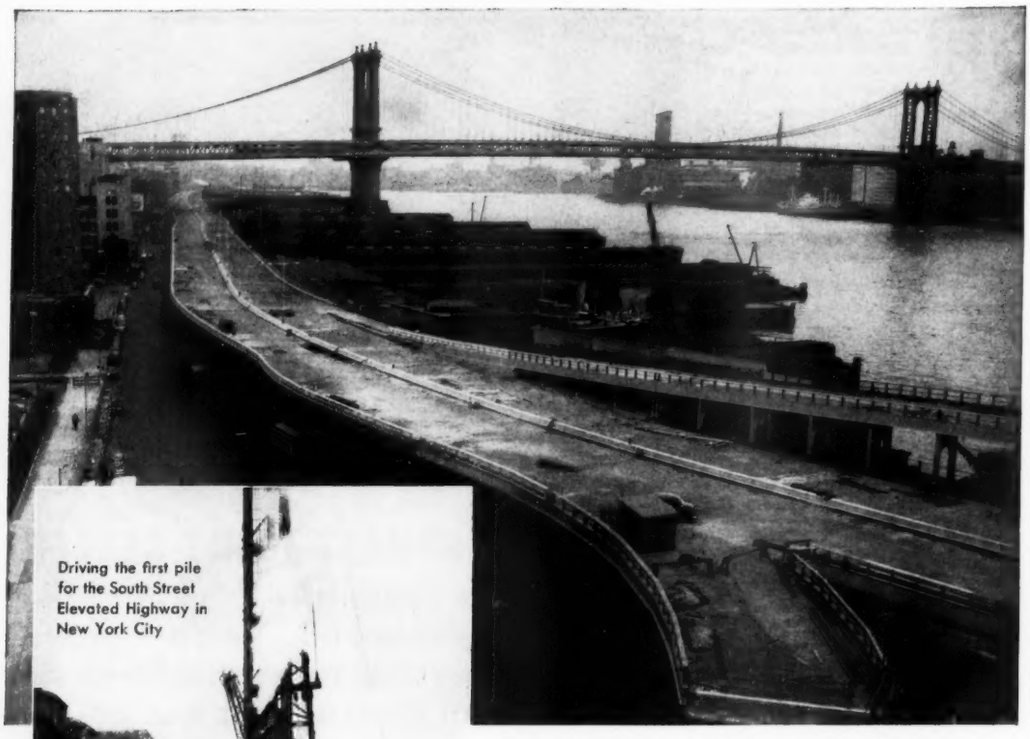
Although smaller and more compact than previous types, these new Timken tapered roller bearings meet the requirements of light vehicles. Write to Timken Roller Bearing Co., Canton 6, Ohio, or circle 131 on card at page 18.

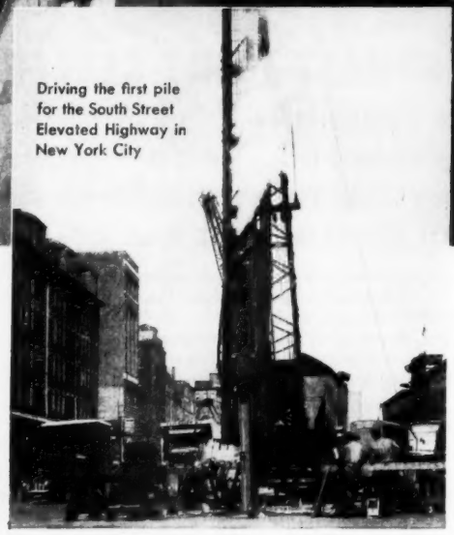


Cemco mobile lubricators and shops are available for truck or trailer mounting. Write to Cemco Industries, Inc., Galion, Ohio, or circle 183 on card at page 18.

New York's Newest Highway

Rests on Piles Driven by McKIERNAN-TERRY Hammers





Driving the first pile for the South Street Elevated Highway in New York City

The South Street Elevated Highway in New York City is the newest link in the circumferential express road around Manhattan Island. It is built on "made" ground along the lower end of the East River, so its columns had to be supported on piles driven to bed rock.

Approximately 1,600 H-beam piles were used for this 1½-mile link, varying in length from 35 feet to more than 200 feet, and the job was vastly complicated by operating in one of the city's most congested areas. For this critical work, the contractor, Fehlhaber Corp. of New York, selected McKiernan-Terry S10 Single-Acting Pile Hammers.

Contractors all over the country are accustomed to use McKiernan-Terry strong speedy equipment for every type of pile-driving job. Write for bulletin describing the complete line of 18 sizes of double-acting hammers and extractors and single-acting hammers.

McKIERNAN TERRY

McKIERNAN-TERRY CORPORATION, Manufacturing Engineers

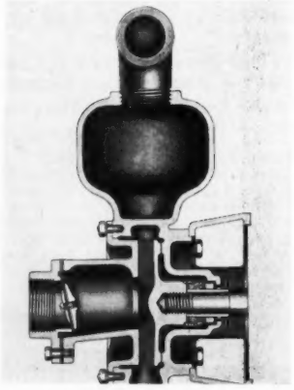
Also manufacturers of Coal and Ore Unloaders and Bridges, Grab Buckets, and Special Machinery

19 PARK ROW, NEW YORK 38, N. Y.

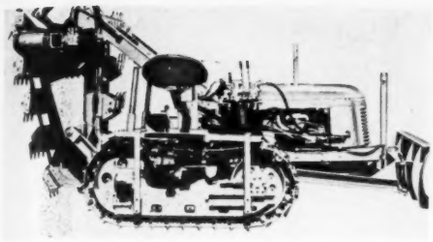
MR 999

The Schramm sump pump has exceptionally large capacity for dewatering purposes. Write to Schramm, Inc., West Chester, Pa., or circle 114 on card at page 18.

A new transit, the Berger Polara, is an accurate moderate-priced surveying instrument. Write to C. L. Berger & Sons, Inc., 37 Williams St., Boston 19, Mass., or circle 133 on card at page 18.

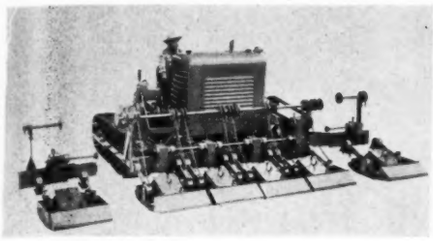


Cutaway view of the Carver self-priming pump illustrates the unit's greaseless mechanical seal. Write to Carver Pump Co., 1056 Hersey Ave., Muscatine, Iowa, or circle 107 on card at page 18.



The model 3A-48 Universal trencher for the Oliver OC-3 crawler tractor has a 4-foot digging depth. A backfill blade is available for the unit. Write to Heller Engineering & Mfg. Co., 11752 S. Alameda St., Lynwood, Calif., or circle 170 on card at page 18.

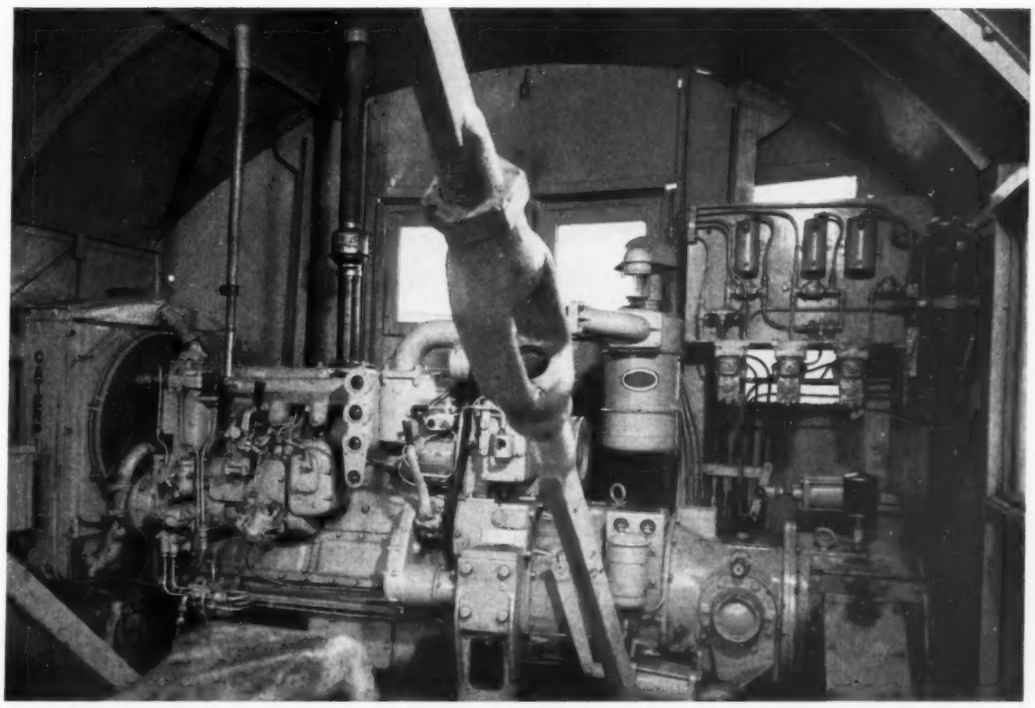
A new cross-conveyor attachment for the Adams Traveloader permits trucks to be loaded from either side with equal speed and ease. Write to J. D. Adams Mfg. Co., P. O. Box 853, Indianapolis, Ind., or circle 172 on card at page 18.



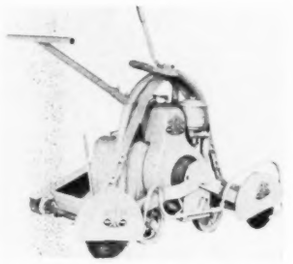
Adjustable-width Model VT6-4 Vibro-Tamper uses 4 to 6 compaction shoes. With the machine, a 15-inch-deep subbase can be laid in a single-course. Write to International Vibration Co., 16702 Waterloo Rd., Cleveland 10, Ohio, or circle 171 on card at page 18.

The new Barber-Greene Model 711 ditcher, mounted on a four-wheel-drive Dodge Power Wagon, has a 45-mph road speed and digs to 5 feet deep and 18 inches wide. Write to Barber-Greene Co., Aurora, Ill., or circle 173 on card at page 18.

With the Thrun front-end bituminous mixer, one motor grader with a single operator blades and road-mixes at the same time. The machine has 44 special alloy-steel teeth. Mixing rotor speed is up to 300 rpm. Write to Thrun Mfg. Co., Pine City, Minn., or circle 174 on card at page 18.



This Caterpillar D318 Diesel—powering a crane—works through a Twin Disc Model CF Torque Converter which provides faster work cycles, protects both engine and driven equipment. Behind the Model CF are a Twin Disc Reverse Gear and two Twin Disc Heavy-Duty Friction Clutches.



With a two-blade arrangement, the new Cutcrete Junior joint saw makes a complete transverse cut from edge to edge without turning around, despite the presence of walls or other obstructions. Wirte to Cutcrete Corp., 265 N. Vinedo Ave., Pasadena 8, Calif., or circle 175 on card at page 18.

With the Elegrader mounted on Adams 550, 610, or 660 motor graders, contractors are loading 400 to 600 cubic yards per hour into bottom-dump trucks. The conveyor is available with a 36 or 42-inch-wide belt. Write to Reisser Corp., Blair, Nebr., or circle 176 on card at page 18.

Why the trend is to Torque Converters

Planning to order a new power unit?

Today, many equipment owners are planning on getting *more* work output . . . and *longer* equipment life: they're ordering their new power units *complete* with Twin Disc Torque Converter Drive. And they're having Torque Converter Drive installed on equipment already working in the field.

Why? Briefly, here are six *proven* reasons why: 1 Through the Twin Disc Three-Stage design, their engines' output torque is *multiplied up to six times* . . . the highest torque multiplication available. Consequently, they're *eliminating* harmful, costly engine lugging and stalling. 2 With Torque Converter Drive, their engines are working up in the maximum efficiency range *all* the time, delivering *constant* high-horsepower output. 3 Power is *automatically* matched to the load demand, with gear-shifting minimized or eliminated. 4 Heavy load pick-up is *smooth, even, without* clutch-slippage. 5 Overloads, shock loads, vibrations and torsional variations are cushioned *out*, through *fluid* connection . . . which means *longer* life, *less* maintenance on engines, transmissions, clutches, drive line components *and* driven equipment. 6 Torque Converter Drive provides an *infinite* variety of ratios to work with, permitting *smooth, accurate control* of the load and delicate "inching" or "holding" under power.

So if you're thinking about a new power unit . . . or thinking about present equipment needing more power, more performance . . . *be sure to get the facts on Torque Converter Drive.* Ask your engine dealer. Or write *today* to Twin Disc Clutch Company, Hydraulic Division, Rockford, Ill., for Bulletin 135-D.

By providing the most COMPLETE line of Industrial-Type Torque Converters available, Twin Disc can accommodate any type gas or diesel engine up to 650 hp—with practically any hook-up. Three series, or sizes, of Three-Stage Torque Converters are provided, with 7 capacities in each size through internal blading variations. A total of 20 different input, output combinations are available, making Twin Disc Torque Converters easily adaptable to any type installation.

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

New Link-Belt Speeder heavy-duty ¾-yard shovel-crane, the LS-88 features Speed-o-Matic power hydraulic controls to increase operating speed and minimize fatigue. Write to Link-Belt Speeder Corp., Cedar Rapids, Iowa., or circle 177 on card at page 18.

The New Teale Loader now has a 9-foot dumping clearance. The loader fits TD-6, D-2, TD-9, D-4, HD-5, and Oliver A and B tractors. Write to Teale & Co., 1415 N. 52nd St., Omaha 2, Nebr., or circle 179 on card at page 18.

The Check-O-Rod, designed as a time-saver for highway construction, checks slopes quickly and accurately. The rod is 4 feet long and made of selected hardwood. Write to Morco Engineering, Box 622, Loring Station, Minneapolis 3, Minn., or circle 193 on card that is bound in at page 18.

Features of the Caterpillar DW15 tractor and No. 15 scraper team are that the combination allows dumping in a higher gear and meets highway axle-weight specifications. For further information write to Caterpillar Tractor Co., Peoria, Ill., or circle 180 on card that is bound in at page 18.

NEW CHEVROLET TRUCKS

engineered and designed with your profit in mind!

Everything about these new Chevrolet trucks spells *profit!* Their low cost, their stamina and dependability, even their traditionally higher resale value!

COST LESS TO BEGIN WITH

That's right, Chevrolet brings you America's lowest-priced line of trucks—so you save right from the start. The beauty of it is, you go right on saving! With the high compression ratio of Chevrolet's three great engines, you register more miles on the job for each tankful of gas. You can count on fast starts; easy pulling up steep grades. You stay on schedule and keep the profits coming in *on time!*

COST LESS TO MAINTAIN

That's because of the rugged strength and stamina engineered into every new Chevrolet truck. They stay on the job longer (actual owner reports prove it!), cutting your maintenance costs right to the bone. Look over the many advance-design features in the next column and you'll begin to see why.

Your best bet is to talk trucks with your Chevrolet dealer. He'll tell you all you want to know about these Chevrolet profit-makers! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

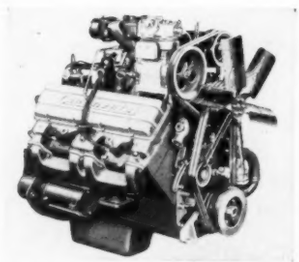
CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—positive-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **RIDE CONTROL SEAT***—eliminates back-rubbing. **LARGE UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give trip-saving load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

The new Windsor pavement cutter, powered by a 26.8-hp motor, uses 12 to 22-inch-diameter diamond blades. The machine features a special cooling and flushing system, and positive depth control. Write to Windsor Machinery Corp., 61 Airport Road, Hartford, Conn., or circle 181 on card at page 18.



High-power-to-weight ratio and unusual compactness are features of the new heavy-duty V8 Continental engines just announced. These are a 240-hp gasoline model and a diesel unit delivering 182 hp at 2800 rpm. Write to Continental Motors Corp., Muskegon, Mich., or circle 182 on card at page 18.

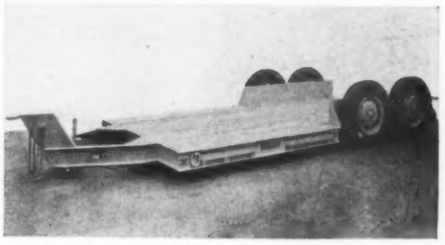
New Gold Medal scaffolding machines allow masons a large, unobstructed working area for mechanized handling of masonry materials. Because of the wide platform, mortar and palletized brick can be wheeled directly to masons' stations. Write to Patent Scaffolding Co., Long Island City 1, N. Y., or circle 184 on card at page 18.

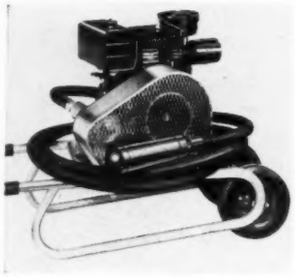
Industrial Brownhoist rubber-tired diesel-electric cranes are now being produced in 25 to 60-ton capacities. Mounted on 12-wheel crane carriers, they travel at speeds up to 8 mph. Write to Industrial Brownhoist Corp., Bay City, Mich., or circle 185 on card at page 18.

Principal features of the new Worthington Blue Brute rotary portable air compressor are an automatic clutch, a unique cylinder arrangement with gravity oil drainage during shutdown, and easy accessibility. Write to Worthington Corp., Holyoke, Mass., or circle 186 on card at page 18.

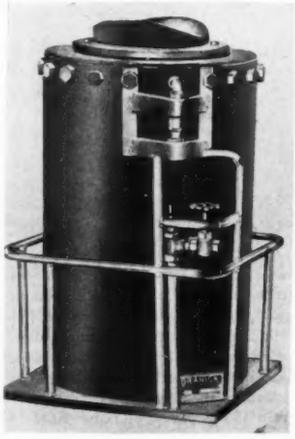
The Finn Klodbuster for dressing slopes consists of a chain with picks that revolve on swivels as the device is being pulled. A slope wheel keeps the chain at right angles. Write to Finn Equipment Co., 2525 Duck Creek Road, Cincinnati 8, Ohio, or circle 187 on card at page 18.

The latest Schertzer low-bed trailer is only 16 inches from the ground and measures 76 inches between tires. The unit is recommended for hauling heavy equipment. Write to Schertzer Equipment Co., 32 Prospect St., Somerville 43, Mass., or circle 188 on card at page 18.



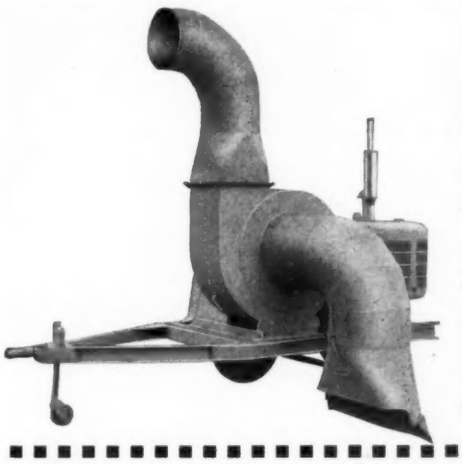


To increase stability and provide greater maneuverability, the Viber Model G gas-engine-driven vibrator has a streamlined carriage with a longer wheelbase and with wheelbarrow-type handles. Write to Viber Co., 726 S. Flower St., Burbank, Calif., or circle 189 on card that is bound in at page 18.



The Branick earthmover jack is air-operated and can raise 9 tons with 165 pounds of air pressure. Write to Branick Mfg. Co., Fargo, N. Dak., or circle 190 on card at page 18.

New Pippin excavators are available for Terratrac and Fordson Major tractors. Write to Pippin Construction Equipment, White River Junction, Vt., or circle 191 on card at page 18.



WHAT'S NEW AT GLEDHILL

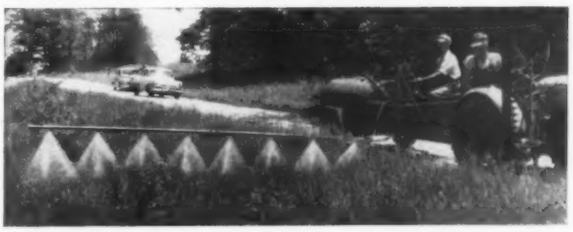
The GLEDHILL-ELLIOTTE Vacuum Leaf Loader

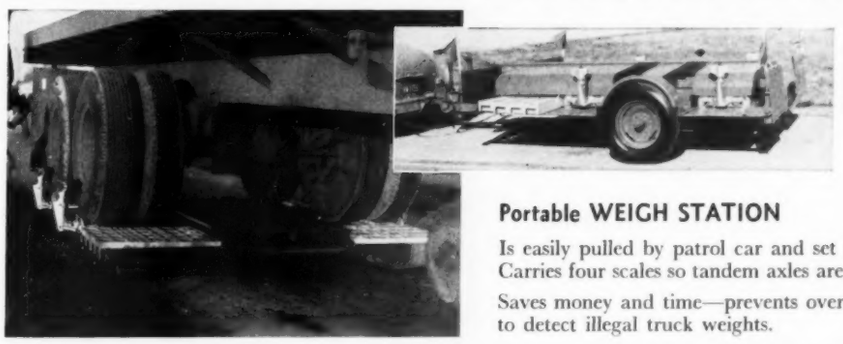
Now standard equipment in over 300 cities across the nation. They leave a trail of no leaves but big savings in time, money and labor.

Powered by independent gasoline engine, mounted on a two-wheeled trailer, it has allied applications—ventilating sewers, dusting, spraying.

ROADSIDE SPRAYER

Offers a complete method of applying weed control chemicals with the safer, low pressure system. Kills plants and roots. Attachments for remote and special applications. Readily towed by Jeep or equal.





Portable WEIGH STATION

Is easily pulled by patrol car and set up within minutes. Carries four scales so tandem axles are no problem.

Saves money and time—prevents over-loading. Also used to detect illegal truck weights.

Attention: Mr. Distributor!

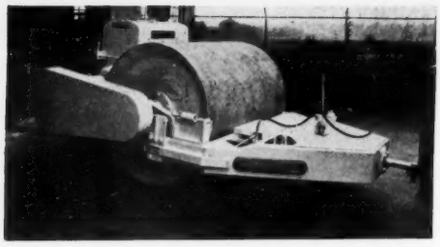
Most of this equipment is sold through regular distributor channels. Why not investigate?

See Us At The
A. E. D. MEETING
CHICAGO — JAN. 23-27

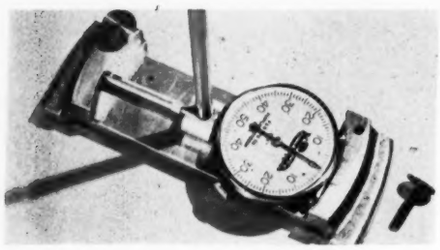
Gledhill also manufactures a complete line of snow plows and light road working machinery.

Send for our complete catalog. No. CE-155

The GLEDHILL Road Machinery Co.
GALION, OHIO

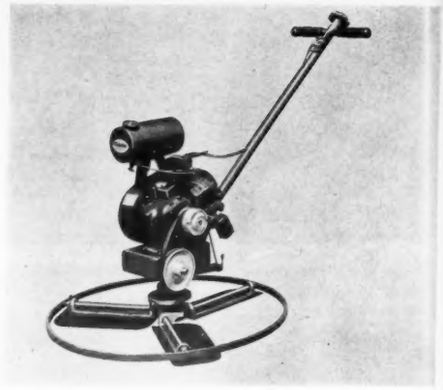


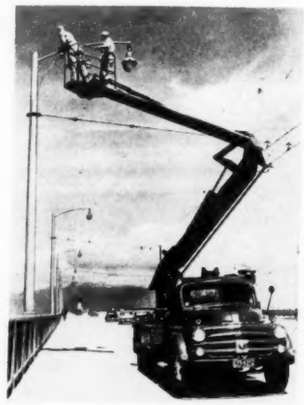
New Vibratory roller for compacting consists of a drum and a built-in vibrator. At a frequency of 1,600 rpm, the 3-ton roller exerts a centrifugal force of 7 tons. Write to Vibro-Plus Products, Inc., 54-11 Queens Blvd., Woodside, L. I., N. Y., or circle 195 on card at page 18.



The P&G valve-gapper overhaul kit for GM-71 diesels makes precision measurements for setting valve clearance, timing fuel injectors, and balancing fuel injector racks. Write to P&G Mfg. Co., 1604 S. W. Tenth Ave., Portland 1, Oreg., or circle 194 on card at page 18.

Lightweight Whiteman troweling machine, the Model M, has a 29-inch trowel diameter. It can be used in crowded areas, giving adequate coverage. The combination trowels can be used for both floating and finishing. The simple pitch adjustment is made through the machine's handle. For further information write to Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles 39, Calif., or circle 192 on card that is bound in at page 18.

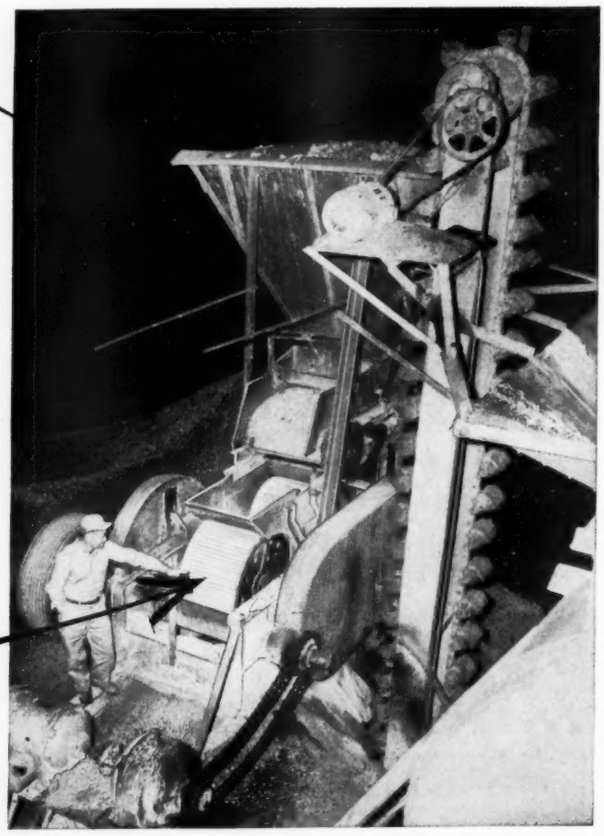




This new hydraulic aerial platform puts workmen 40 feet into the air. The Giraffe has a two-section boom, and handles up to 450 pounds at any radius without outriggers and 1,000 pounds with outriggers. Write to the Pitman Mfg. Co., 300 W. 79th Terrace, Kansas City 14, Mo., or circle 198 on card at page 18.

Versatile rear-end mechanism for tractors mounts a ⅝-yard bucket, a scarifier, and a backhoe. The Pit-Bull also mounts a trencher, roller, an angle and straight dozer, crane, and lift fork. Write to Mid-Western Industries, Inc., Wichita, Kansas, or circle 199 on card at page 18.

Crushing Life Increased 500% by **Hard-Facing** with HAYNES 90 rod



Hard-facing the rolls in this crusher rig with HAYNES 90 Rod makes them more than 5 times more durable. Two sets of rolls are used to crush rock from 3-in. down to ½-in. screen size. They handle up to 26 thousand tons of rock with a minimum of repairs—despite severe wear from abrasion and impact. Other hard-facing materials wore out before 5,000 tons of rock were crushed.

Since HAYNES 90 Rod was adopted as the standard material on this job, production increased, down-time was reduced, labor and maintenance costs were cut, and less hard-facing material was needed per ton of rock crushed. This is typical of the kind of savings that can be realized by hard-facing with HAYNES alloys.

HAYNES hard-facing alloys give outstanding service when used to protect parts in crushers, shovels, tractors, trucks, conveyors, and other metal parts exposed to wear from abrasion, impact, corrosion, or heat.

Your local dealer carries a complete line of HAYNES hard-facing alloys, including: HAYNES iron and nickel-base rods, HAYNES STELLITE cobalt-base rods, and HAYSTELLITE tungsten carbide tube rods. Ask him for descriptive literature. If you don't know the location of your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana.

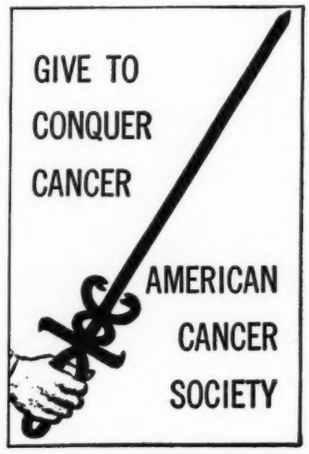
See... Your local Haynes Stellite Dealer

or

Write... to Haynes Stellite Company

"Haynes," "Haynes Stellite," "Haystellite" are registered trade-marks of Union Carbide and Carbon Corporation.

GIVE TO CONQUER CANCER



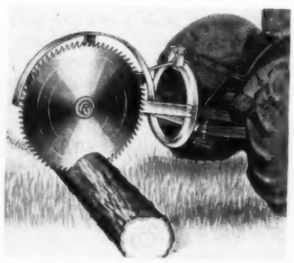
AMERICAN CANCER SOCIETY

This new TerraTrac loader, the Model 500, features power-controlled digging and dumping; longer, wider tracks; and improved operator vision. New TerraTracs are available in ½, ⅝, and ¾-yard sizes. They may be obtained under the manufacturer's new long-term lease plan, with or without option to buy. Write to American Tractor Corp., Churubusco, Ind., or circle 20 on card at page 18.

A 5-foot-wide hydraulic front-end loader of 1-cubic-yard capacity is a new accessory for the Seaman Pulvi-Mixer. Also offered as accessories are a scarifier and a 7-foot dozer blade, both hydraulic. The Seaman Trav-L-Plant and Pulvi-Mixer also feature 51 mechanical and structural improvements. Write to Seaman Motors, Inc., 282 N. 25th St., Milwaukee 3, Wis., or circle 26 on card at page 18.

Calweld bucket-type earth drills are now equipped with a special bucket positioning arm which swings the bucket mechanically to the desired dumping position. The new device is operated from the control panel located at safe distance from the bucket. Power comes from a winch hoist. Write to California Welding & Blacksmith Shop, Inc., 7222 E. Slauson Ave., Los Angeles 22, Calif., or circle 30 on card at page 18.

The new Florline marking machine has a two-wheel assembly attached to the barrel to keep the machine "on track" at fast working speeds. A slight lift of the handle raises the brush to make skip lines. Write to H. C. Sweet Co., 12345 Telegraph Rd., Detroit 39, Mich., or circle 31 on card at page 18.



The Rocklin Sawmobile, attaching directly to the power takeoff of all 3-point hitch tractors, cuts logs right on the ground. Write to Rocklin Mfg. Co., Sioux City 2, Iowa, or circle 197 on card at page 18.

ROAD BUILDERS — IT'S SENSATIONAL

DRAGS **PECKERWOOD** DRAGS

STEEL SPRING WIRE ROAD BROOMS

MADE IN ANY C-O-N-T-I-N-U-O-U-S LENGTH UP TO 12 FEET
WIDTH 6 INCHES—IT'S DIFFERENT
ASSEMBLE YOUR OWN—IN ANY SHAPE REQUIRED—IN MINUTES, NOT HOURS

NO FRAME REQUIRED

MADE WITH KILN DRIED 6" WIDE HARDWOOD AND HEAVY SPRING STEEL WIRES TRIPLE OUT EACH HOLE. NOT STAPLE SET.

THIS IS IT — ORDER NOW

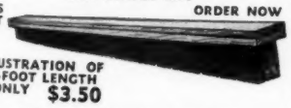


ILLUSTRATION OF 10-FOOT LENGTH
ONLY **$3.50**

RUNNING FOOT F.O.B. KC., MO.
NOTICE! Our 15" length Unit Drag 3" wide with the two bolts that fit your frame, still $2.50 ea.

SINCE **VAN BRUSH MFG. CO.** 1928
327 S. WEST BLVD., KANSAS CITY 8, MO.

It's tire-tough, because it's built the way a tire is—with *an exclusive hose construction no other maker matches.*

Proved in mines and quarries everywhere, U. S. Royal Cord Hose offers extremely high hydrostatic value, with a minimum of contraction and elongation. And with its great flexibility, shear resistance and toughness, it can be run over repeatedly by heavy equipment without harm.

Recommended particularly for applications where shock and excessive pressures are met, U. S. Royal Cord is available in continuous lengths from any of our 27 District Sales Offices, or by writing to the address below. *Whatever* your hose requirement, you'll find it pays to turn to "U. S." There's a job-engineered U. S. Hose for practically every purpose—an expert staff of "U.S." engineers to assist you in your hose selection.

This hose took a tip from a tire!

U.S. Royal Cord Air Hose

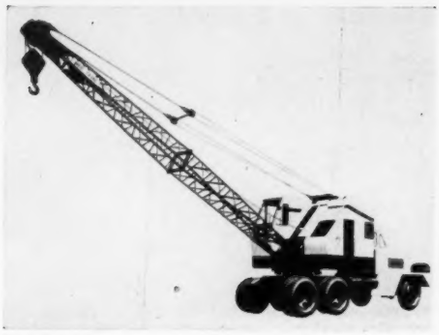
* tube of high quality neoprene for maximum oil resistance.
* braided cotton breaker ply anchors tube to carcass lastingly.
* Exclusive. Two counter-spiralled plies of tough special cord floated in resilient rubber for outstanding strength, shear resistance and flexibility.
* tough, brown natural rubber cover gives excellent cut and abrasion resistance—protects unique construction under extreme service conditions.

"U.S." Research perfects it..."U.S." Production builds it... U.S. Industry depends on it.

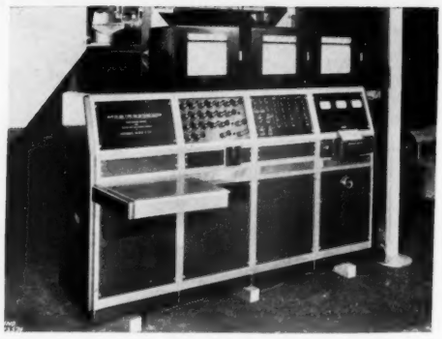
UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting



The new Dixie crane is a compact excavator in the ⅜-yard 5 to 6-ton class. The unit is offered as a crane, shovel, or trench hoe rig, and is available on either a rubber-tire crane carrier or on 20-inch crawler tracks. A complete line of attachments for dragline, clamshell, magnet, pile driver, grapple, or concrete bucket work is available. Write to Dixie Crane & Shovel Co., 2343 N. Seventh St., Harrisburg, Pa., or circle 5 on card at page 18.

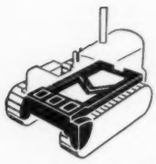


A punched card is the batching operator in the new Butler XK1 electronic batcher. The card actuates the electronic controls which select, proportion, fill, weigh and discharge any of 6 aggregates, 3 cements, and water. These controls are automatic and completely interlocked. The electronic controls also compensate for moisture content of aggregate. Write to Butler Bin Co., Waukesha, Wis., or circle 6 on card at page 18.

Dart's new 40,000-pound bottom-dump trailer truck, the Model 15S-BDT, has a 15-cubic-yard capacity. The wheelbase of the tractor is 100 inches. The trailer truck is powered by a Cummins HRS 225-hp diesel engine and has Ross hydraulic steering. Bottom-dump doors are operated hydraulically or by cable control. Write to Dart Truck Co., 2621 Oak St., Kansas City 8, Mo., or circle 15 on card that is bound in at page 18.

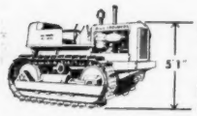
Why the HD-5 gives you EXTRA DOZE-ABILITY

Here are reasons why more and more builders are choosing the popular Allis-Chalmers HD-5 Tractor for all kinds of dozing jobs—from land clearing to landscaping.



Built with Dozing in Mind The HD-5 is the only crawler in its weight and power class that is *new* in design and built with dozing in mind. The engine is not used as a structural member. Instead, weight and working stresses are carried by a full-length, all-steel welded main frame. This type of frame allows closer mounting of the blade, reduces front-end overhang for better balance, permits more direct down pressure on the blade, eliminates bulky track-straddling frame that often clogs up. The HD-5 is built to stand the gaff in clearing land, building streets — any heavy dozing.

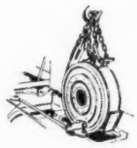
Works Anywhere, Any Time Crawler design features large idler and sprockets, puts more track on the ground for better traction in soft, mucky ground — as in digging drainage ditches or filling in low, swampy areas. Plenty of weight, with low center of gravity, also helps assure good traction for all dozing.



Compact for Tight Places Only 5 ft, 1 in. high and less than 13 ft long, including blade, the HD-5 packs a lot of dozing punch (50 belt hp) in small space—works easily between houses, around poles and trees, any narrow quarters. Double reduction final drive allows ample 11¼-in. ground clearance.

Smooth Hydraulic Blade Control makes it easy for the operator to work all day without undue tiring effort, permits the accuracy needed for finish grade, working close to manholes, other objects. Full vision, simplified shifting, convenient controls, easy steering — all help the operator get the most work done with the least effort.

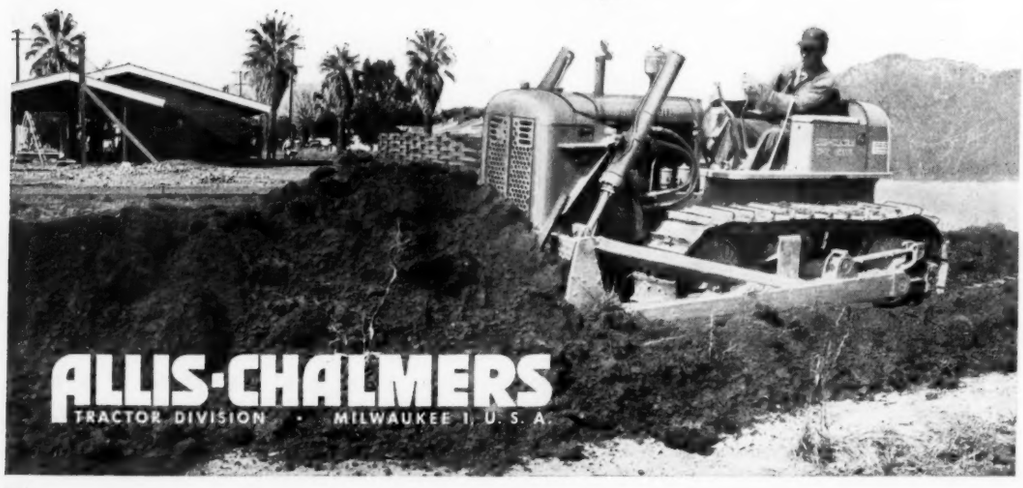
Quickly Hauled Job-to-Job by truck or small trailer, the HD-5 might be backfilling trenches on one job and a short time later be at another location several miles away excavating or cutting drainage ditches.



Maximum Work Time, Minimum Down Time Unit construction allows removal of major assemblies such as engine, clutch, transmission, steering clutches or final drive without disturbing adjacent assemblies, for big saving in down time — accessibility saves time for inspection, adjustment and servicing — exclusive 1,000-hour lubrication interval for truck wheels, idlers and support rollers cuts greasing time.

Write for literature giving more information — or let your Allis-Chalmers dealer show you how the HD-5B does outstanding work on all types of dozing. He will be glad to demonstrate right on your own job.

50 belt hp, 11,250 lb (bare tractor)



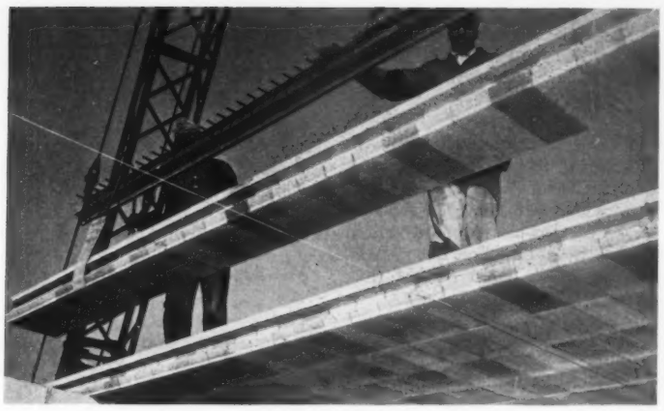
The use of Hobbs Schonrock cable-dump trailers on a recent job for the Ft. Worth Sand & Gravel Co. saved 36 per cent in hauling costs, according to the Hobbs Mfg. Co. Shown is a single-axle cable-dump unit moving out with what 2 dump trucks would normally carry. The tractor is a regular Ford Model M-600. Hobbs Schonrock trailers feature a unique dumping mechanism consisting of a weight-saving cable arrangement. Write to Hobbs Mfg. Co., 609-623 N. Main St., Ft. Worth 1, Texas, or circle 18 on card at page 18.

In winter mud and snow All-Steel Truck Tracks can cut down delays by giving tractor performance to single or tandem-axle trucks or earthmoving equipment. A new shipment of these demountable tracks is available for purchase by contractors, according to a bulletin from P&G Supply Co., 2262 N. Albina, Portland 12, Oreg. Circle 196 on card at page 18.

KIESLER
Since 1892
2-LEVER ARM CLAM SHELL BUCKETS with POWER ON BOTH SHELLS
"A PAYLOAD EVERY TRIP"
The ONLY Bucket that DIGS-IN instead of Lifting-Out. Write for Literature.
JOS. F. KIESLER COMPANY
934 W. HURON ST. CHICAGO 22, ILL.

Building Materials

New developments make possible improved construction techniques; advances reported in concrete products, steel, and precast units.



Master Builders is now offering a handy placard containing tips on the use of additives, heating, and special curing provisions to meet **cold-weather concreting** problems. The placard has an easy-to-use chart to help the contractor determine the temperature of water to be used with concrete, aggregate, and cement of various temperatures. Also available on request are a number of special bulletins discussing various other aspects of cold-weather concreting. Write to Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio, or circle 134 on card at page 18.

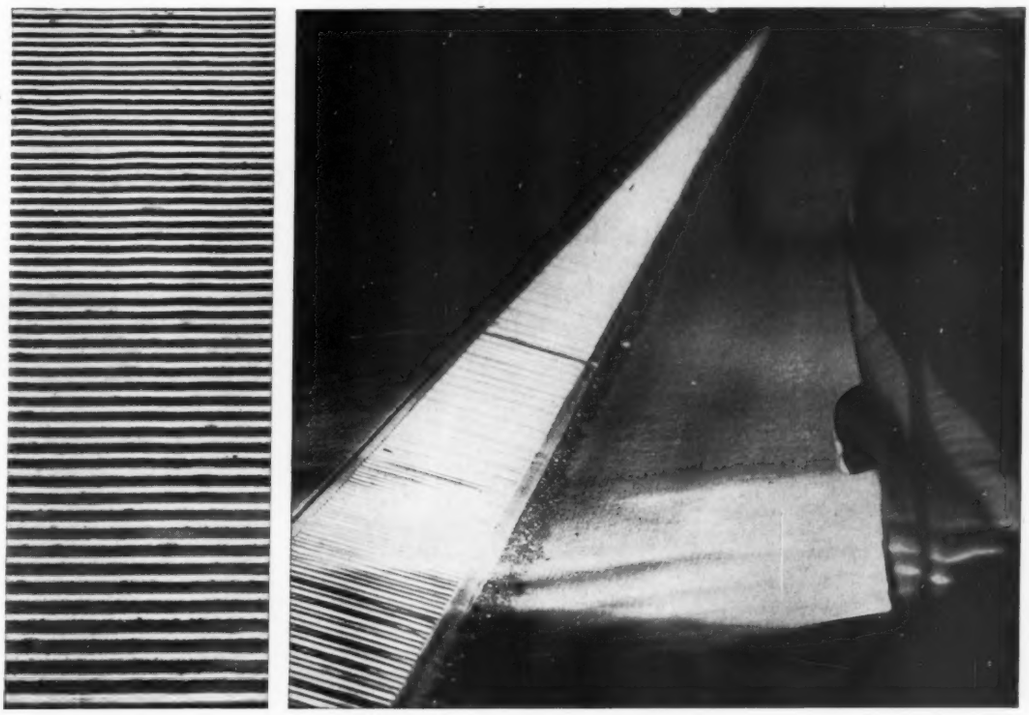
To keep concrete from freezing, A. C. Horn Co. offers a colorless solution, **No-Freeze.** The additive permits cement to be placed, brick to be laid in cement mortar, and concrete floors to be put down in winter. A handy check card available from the manufacturer shows how to determine the proper amount of No-Freeze to use. Write to A. C. Horn Co., Inc., 10th St. and 44th Ave., Long Island City 1, N. Y., or circle 161 on card at page 18.

Manufactured by a cold twisting process, **Webrib concrete reinforcing** bars have a minimum yield strength of 60,000 psi. It is claimed by the manufacturer that 2 tons of Webrib bars will do the work of 3 tons of ordinary steel reinforcing bar. The dumbell-shaped bars also provide a larger perimeter for bonding than do reinforcing rods of conventional shape. Write to Webrib Steel Corp., 120 Broadway, New York 5, N. Y., or circle 136 on card at page 18.

Literature listing specifications on Permite clear or white pigmented curing compounds is available on request. The literature lists exact specifications and describes the cost and labor-saving advantages offered by the **concrete curing compounds.** Write to Aluminum Industries, Inc., Cincinnati 25, Ohio, or circle 156 on card at page 18.

The physical and chemical value of Rosendale **natural cement,** which is blended with portland cement to improve concrete, is discussed in a series of bulletins available on request. Write to Wait Associates, Inc., 51 E. 42nd St., New York 17, N. Y.

Long beams, pre-assembled at the factory from blocks of Haydite expanded shale, aggregate, and portland cement, are delivered to the builder ready for concrete roof and floor erection. These beams are reinforced with steel rods, and in the process of manufacture can actually be pre-arched or cambered to offset deflection due to dead load. **Rapidex slab units** are 16 inches wide, and are available in 6 and 8-inch depths and in lengths up to 30 feet for the 8-inch depth. The unique design of the individual blocks used in the fabrication of Rapidex slabs provides a tongue and groove joint between the unit slabs. When joints are properly grouted the entire deck area becomes

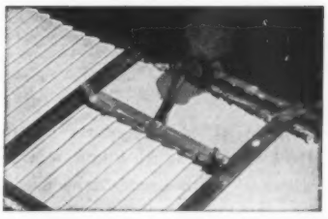


Mark of a safer highway

White concrete reflecting curbs and markers make modern highway lanes more visible to drivers—day and night. That's why so many highways today make driving safer round the clock—with White Concrete Reflecting Curbs and Traffic Markers made with Atlas White Cement.

Corrugated faces on these safer driving aids are scientifically designed to reflect headlight beams back to the driver. At night, these faces catch the light and become bright white guides to curves, hills and merging traffic. In the rain—when it's needed most—this reflection is even more effective. During the day, the true white of Atlas White Cement stands in marked contrast to the darker highway pavement and shoulders.

More and more engineers are specifying White Concrete Reflecting Curb for greater highway safety. Investigate it for *your* next project. For complete information, write to Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.



Fast, easy placement with Atlas White Duraplastic* Cement mortar mix. One method is to place mix on grey concrete base, screed to one-inch thickness and score with hand tool. Duraplastic air-entraining cement makes mixes more workable, plastic and easy to place.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

CE-CB-78R

ATLAS® WHITE CEMENT
For Concrete Reflecting Curb and Markers

UNITED STATES STEEL HOUR—Televised alternate weeks—See your newspaper for time and station.

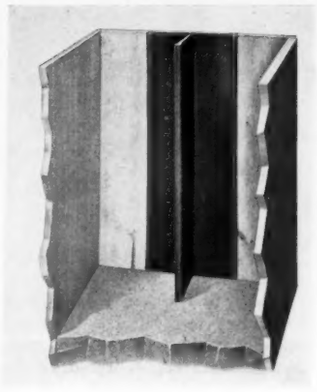
Vulcan Tools
— FOR —
Rock Drills, Pavement Breakers and Clay Diggers
Vulcan Tool Manufacturing Co.
35-43 Liberty Street, Quincy 69, Mass.
Branch Offices and Warehouse Stock.
57 Leonard St. 34 No. Clinton St.
New York 13, N. Y. Chicago 6, Ill.
Send for catalog or see your local distributor.

an integral slab. Write to Rapidex Co., Division of Spickelmier Co., 1100 E. 52nd St., Indianapolis 5, Ind., or circle 148 on card at page 18.

A smooth-bore **suction hose** with a red cover, the Revelation, recovers its original shape after being crushed. Reinforcing wire has been replaced by a specially-treated hard-twisted cord. Write to Hamilton Rubber Mfg. Corp., P. O. Box 361, Trenton 3, N. J, or circle 143 on card at page 18.

Precast reinforced **concrete bridge slabs** for economical permanent bridge installations are illustrated in a booklet from Choctaw, Inc. The precast slabs are designed for H-15 loading and, according to the manufacturer, have actually sustained greater than H-20 loading without failure under tests. Four basic slabs manufactured are 3-foot 6-inch and 3-foot 9-inch curb sections, a 3-foot 6-inch interior section, and a 2-foot 6-inch special interior section. A combination of the four different sections permits construction of bridges to any specified roadway width. All four basic units are available in either 15-foot or 19-foot lengths. Write to Choctaw, Inc., P. O. Box 2057, Memphis 2, Tenn., or circle 154 on card at page 18.

A new **split-type waterstop** is supplied with one-half of the width split so that the waterstop may be fastened to the inside of the bulkhead in such a manner as to form a T. This eliminates the need for slotting or splitting the bulkhead, saving time and labor. After the section has been poured, the bulkhead is stripped and



the two divided sections are joined together with rubber cement or by stapling. Write to Servicised Products Corp., 6051 W. 65th St., Chicago, Ill., or circle 144 on card at page 18.

Corrugated sectional plates for pipes, arches, and pipe-arches are available from Young & Greenawalt Co. The prefabricated metal plates offer a methed for building **low-cost drainage structures.** Literature available discusses the uses and advantages of the sectional plates and lists specifications for diameters as large as 180 inches. Write to Young & Greenawalt Co., 1011 E. 148th St., East Chicago, Ind., or circle 137 on card at page 18.

Steel-grid bridge flooring of six different types is illustrated in a new folder. The literature contains data on Reliance 3 and 3½-inch I-Beam Weld, 4½-inch I-Beam Interlock, and T-Weld Sidewalk, which are concrete-filled types of steel flooring. Also described are Reliance Rectagrid and 5-inch Weldlock serrated nonskid floorings, as well as inlet grating. Write to Reliance Steel Products Co., 3694 Walnut St., McKeesport, Pa., or circle 146 on card at page 18.

For starting of diesel and gasoline engines in any weather, the Sta-Vis Oil Co. offers a specially-prepared chemical product. According to the manufacturer, the **starting fluid,** when used according to directions, will start engines in a temperature of 30 degrees below zero, bringing them to the point where they will run freely on regular fuel in 10 seconds. Write to Sta-Vis Oil Co., St. Paul, Minn., or circle 138 on card at page 18.

New ribbed **siding made of aluminum** was announced recently by Alcoa for use in industrial buildings. The siding sheet is intended primarily for frame-type structures, but it can also be used as a facing sheet on concrete-block buildings. The new siding is available in a .032-inch thickness in 5 to 18-foot lengths. Write to Aluminum Co. of America, 745 Alcoa Bldg., Pittsburgh 19, Pa., or circle 145 on card at page 18.

An unusual **roof decking material** called Tectum is made of wood fibers bonded with an inorganic cement. The product is available in plank and tile form. It is reported to have a high insulating value and excellent acoustical properties, and according to the manufacturer, has passed Underwriters Laboratory tests for noncombustibility. Write to Tectum Division. Alliance Mfg. Co., 246 N. High St., Columbus 16, Ohio, or circle 139 on card at page 18.

A new kind of tarpaulin is treated with aluminum and Elastiseal—a rot-resistance process. In addition, the **AlumiZel tarpaulin** is made from a new type of canvas that has equal strength in both directions. The metallic-treated tarpaulin is reported to be flexible even in subzero weather. Write to H. Wenzel Tent & Duck Co., 1035 Paul St., St. Louis 4, Mo., or circle 141 on card at page 18.

Expansion-joint filler made of Fiberglas keeps the joints between concrete sections from filling with foreign matter and water when the concrete contracts in cold weather. It also allows the joints to close without creating joint bumps when the slab expands in hot weather. Literature offered gives specifications and illustrates typical uses of the expansion joints on highways, streets, side-

Barnes Pumps

. . . . . HOLD 6-MONTHS SCHEDULE IN

COMPLETING 645-MILE LAKEHEAD PIPELINE EXTENSION!

Barnes Self-Priming Pumps held down the water level in stream beds while wagon drills pierced rock for blasting. Wherever water was wanted or unwanted on the Lakehead Pipeline Extension — you saw Barnes Pumps working right along with the men — 12 hours a day — 6 days a week!

Barnes has a pump for every pumping need — from 1,000 to 90,000 gph. capacities. Choice of Gasoline, Diesel, Electric or Pulley Drives.

"ON SCHEDULE" — every contractor knows what that means! Here a Barnes 3-inch Pump, working under toughest conditions, is "on schedule" with Barnes dependability and performance! Laying 645 miles of 30-inch pipe from the lakehead ports of Duluth and Superior across Northern Wisconsin and Upper Michigan, under the Strait of Mackinac, southeasterly across Michigan and under the St. Clair River to Sarnia, Ont., was rugged work! And *Barnes makes rugged pumps* — for rugged work — in rugged terrain — *to keep rugged schedules!* When the going is tough, call for Barnes Self-Priming Centrifugal Pumps. See your distributor or write Barnes about your problem — there's a Barnes Pump to solve it!

★ AED CONVENTION — See us at the Conrad Hilton in our Headquarters Parlor

FOUNDED 1872 Barnes MANUFACTURING CO. MANSFIELD, OHIO

BARNES MANUFACTURING CO.

Mansfield, Ohio Oakland 21, Calif.

walks, airports, and bridges. Write to Owens-Corning Fiberglas Corp., Toledo 1, Ohio, or circle 159 on card at page 18.

A number of new developments in the manufacture of **wire rope** are reported from the Muncy, Pa., plant of the Jones & Laughlin Steel Corp. This company has recently introduced a wire rope with a core of noncorrosive, acid-resistant polyvinyl plastic, and another with a core of coiled steel spring. Write to Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa., or circle 142 on card at page 18.

Grating for a wide variety of purposes is illustrated in a booklet from Irving Subway Grating Co., manufacturer of riveted, pressure-locked, welded **gratings.** Also of interest is the company's folder showing its aluminum gratings for industrial flooring, bridge decking, and other installations. Write to Irving Subway Grating Co., Inc., 50-09 27th St., Long Island City 1, N. Y., or circle 150 on card at page 18.

Cold weather retards the set and strength development of any concrete. A product that helps overcome these problems is **Sikacrete,** an accelerating densifier. This additive accelerates set and increases the workability, density, and water resistance of concrete and mortar. Literature is available on request. Write to Sika Chemical Corp., 35 Gregory Ave., Passaic, N. J., or circle 157 on card at page 18.

The versatility of Jennite J-16 **surface seal** for preserving blacktop pavements is the subject of new literature. In addition to its use on bituminous pavements, the coal-tar pitch coating may be employed for concrete floor and pavement sealing, damp-proofing, waterproofing, metal-roof sealing, and the protection of metal against corrosion. Write to Maintenance, Inc., Wooster, Ohio, or circle 153 on card at page 18.

Bethlehem **formed steel bridge flooring** is a corrugated flooring consisting of formed steel plates attached to either steel or wooden bridge stringers to provide a continuous base, over which bituminous concrete is applied. The easily installed flooring meets the strength specifications of the American Association of State Highway Officials, according to the manufacturer. Write to Bethlehem Steel Co., Bethlehem Pa., or circle 158 on card at page 18.

Welded open-web-type steel bar **joists for floor and roof construction** are now being produced by Joseph T. Ryerson & Son, Inc., steel distributor. The joists are supplied fabricated to order, and are delivered to the job site properly tagged and ready for placing. Write to Joseph T. Ryerson & Sons, Inc., Box 8000-A, Chicago 80, Ill., or circle 152 on card at page 18.

Six newly **improved tracing papers** and cloths have been introduced by the Charles Bruning Co. recently. Superior translucency, permanence, and uniformity are claimed for the materials, even with repeated erasures. Write to Charles Bruning Co., Inc., 4700 Montrose Ave., Chicago 41, Ill., or circle 140 on card at page 18.

MODEL 20-S

20-ton end dump truck—120" wheelbase. Powered by 225 HP Diesel Engine with or without torque converter. 70,000 lb. Dart planetary rear axle with 20" x 9" air brakes—20,000 lb. front axle with 17¼" x 4" air brakes—14:00 x 24, 20-ply front tires—16:00 x 24, 24-ply rear tires. Hydraulic steering—13 cubic yard R/Q body. Approximate weight, 35,000 lbs.

MODEL 300/747—45-ton crane carrier—220" wheelbase. Powered by 200 to 250 HP Gasoline or Diesel Engine with 5-speed transmission and 2-speed auxiliary transmission. 25,000 lb. front axle with 20¼" x 5" air brakes—90,000 lb. tandem rear axles with 20¼" x 7" air brakes—(10) 14:00 x 24, 20-ply tires all around. Hydraulic steering. Approximate weight of chassis, 50,000 lbs. Other models available.

MODEL 15DT—Chassis for 7-7½ cubic yard mixer—138" wheelbase. Powered by 165 HP Gasoline Engine with 5-speed transmission and 3-speed auxiliary transmission. 22,000 lb. tandem front axles with 17¼" x 3" air brakes—28,000 lb. tandem rear axles with 16" x 5½" air brakes—(12) 10:00 x 22, 12-ply tires all around. Approximate weight of chassis, 14,000 lbs.

MODEL 55TA—55-ton end dump truck—211" wheelbase. Powered by two 300 HP Diesel Engines with torque converters. 200,000 lb. Dart planetary drive tandem rear axles with 20" x 9" air brakes—50,000 lb. front axle suspended with a hydraulic air strut with 20" x 9" air brakes. Steering by hydraulic power on a center bearing cushioned by captive air in hydraulic air strut. 18:00 x 25, 32-ply tires all around—30 cubic yard rock body. Approximate weight, 96,000 lbs.

MODEL 10-S—10-ton end dump—106" wheelbase. Powered by 156 HP Diesel Engine—14,000 lb. front axle with 17¼" x 3" air brakes—26,000 lb. full floating double reduction rear axle with 16½" x 7" air brakes—12:00 x 20, 16-ply tires all around. Hydraulic steering—6½ cubic yard R/Q body. Approximate weight, 20,000 lbs.

MODEL 30-SL—30-ton end dump truck. Full cab. 184" wheelbase. Powered by 300 to 350 HP Diesel Engine with or without torque converter. 100,000 lb. Dart planetary rear axle with 20" x 9" air brakes. 25,000 lb. front axle with 20¼" x 5" air brakes. 14:00 x 24, 28-ply front tires (16:00 x 25, 24-ply optional)—18:00 x 25, 32-ply rear tires. Hydraulic steering—20 cubic yard Rock body. Approximate weight, 46,000 lbs.

MODEL 35SA—35-ton end dump truck—169" wheelbase. Powered by 300 to 400 HP Diesel Engine with Torque converter. 100,000 lb. Dart planetary rear axle with 20" x 9" air brakes—50,000 lb. front axle suspended with a hydraulic air strut with 20" x 9" air brakes. Steering by hydraulic power on a center bearing cushioned by captive air in hydraulic air strut. 18:00 x 25, 32-ply tires all around—24 cubic yard Rock body. Approximate weight, 52,000 lbs.

Advanced Engineering Makes DART Your Best Truck Buy

WHAT IS YOUR HAULAGE PROBLEM?

For over 52 years, DART has engineered and built trucks for heavy-duty, off-highway haulage. In the progression of years, many important improvements and a long series of DART "Firsts" have resulted. Exclusive features in DART TRUCKS may save time and money on your job. DART engineers may have the answer to your particular truck haulage problem.

The World's Largest Selection of Off-Highway Trucks . . .

10 TON TO 75 TON CAPACITY

MODEL 15S-BDT—15 cubic yard bottom dump truck—100" wheelbase (tractor). 70,000 lb. Dart trailer axle with 20" x 9" air brakes. Hydraulic or cable operated doors. Front tires, 13:00 x 24. Rear tractor and trailer tires, 24:00 x 25. Approximate weight of tractor-trailer, 40,000 lbs.

MODEL 200/456—25-ton crane carrier—184" wheelbase. Powered by 130 to 200 HP Gasoline or Diesel Engines with 5-speed transmission and 2-speed auxiliary transmission. 14,000 lb. front axle with (optional) 17¼" x 3" air brakes. 50,000 lb. tandem rear axles with 16½" x 7" air brakes. (10) 11:00 x 20, 12-ply tires all around. Hydraulic steering (optional). Approximate weight of chassis 26,500 lbs. Other models available.

Seeing is believing, so...See us at the A.E.D.

DART TRUCKS (TONNAGE ENGINEERED)

Kansas City 8, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

SOILS ENGINEERS and CONTRACTORS . . .

Investigate the

WASHINGTON Dens-o-meter

The KEY to *accurate* field tests for moisture-density of embankment and foundation soils

Developed after two years research and experiment by Department of Highways, State of Washington. Opens up entirely new possibilities for earthwork engineers and contractors. Engineers can now make accurate moisture-density and compaction tests

- **in all large or small holes**
- **in all types soils and granular base materials**
- **in about 3 minutes after hole is dug**

Now for the first time, holes of any size from 0.000 cu. ft. to 0.500 cu. ft. can be measured with the same equipment. Holes up to 22 inches in depth can be measured—singly or in successive lifts.

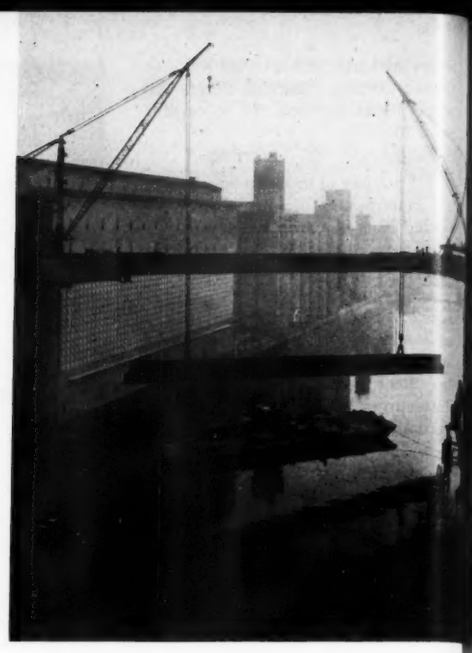
Get full information from

Exclusive Sales Agents

CHARLES R. WATTS & CO.
4121 SIXTH AVENUE NORTHWEST
SEATTLE 7, WASHINGTON

Equipped with 115-foot booms and 53-foot masts, derrick travelers pick the first 208-foot-long girder off a barge and lift it into place on the High Level Bridge over the Buffalo Ship Canal.

Girders form link in High Level Bridge



The second of the 167-ton girders is being set. Bethlehem Steel Co. fabricated the members, and its Pittsburgh Erection District is in charge of steelwork on the bridge.

Steelwork, scheduled to be finished this spring on the High Level Bridge over the Buffalo Ship Canal, moved a step nearer completion a few weeks ago as two huge girders were set to link the south and north ends of the bridge.

This $12 million project on the Erie lakefront is being constructed by the New York State Department of Public Works to speed the flow of traffic between urban Buffalo and its suburbs to the south. Ultimately, a downtown interchange will provide a link between the span and the 25-mile Niagara section of the New York State Thruway.

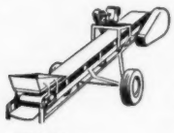
Lifting Girders

The massive 208-foot-long and 12½-foot-deep girders, fabricated at the Rankin, Pa., works of the Bethlehem Steel Co., were shipped by rail to the site in three pieces. At the terminal in Buffalo, the pieces were unloaded from the railroad cars, assembled on a large barge in the Ship Canal, and riveted together. Since the girders have a large broadside area offering considerable wind resistance, they had to be lifted in wind of less than 18 mph.

To permit the 167-ton members to be lifted the 120 feet to the bridge without interruption, the District Office of the U. S. Army Corps of Engineers closed the canal to navigation while the lifting operation was under way. The girders were set 40 feet apart—center to center. Each was lifted into place by two 115-ton-capacity derrick travelers, one located on each side of the canal. These travelers, equipped with 115-

MIX ON-THE-JOB with the
WILLARD "TASK FORCE"

WILLARD Weigh-Batch Loader



WILLARD Mixer Loading Conveyor

WILLARD Truck Mixer

GET MORE DONE with less expense with Willard portables like the typical company shown above. Their fast-operating spread consists of self-loading Weigh-Batcher, Mixer Loading Conveyor and two Truck Mixers . . . all bought for a fraction of the cost of a big stationary plant. Only two drivers, a batcher man and a dispatcher are needed.

You take Willards right to the project for maximum efficiency . . . using multiple stock piled aggregates and bulk cement for specification concrete. Moving to a new location requires no effort beyond digging a shallow pit for the foot of the conveyor. The "Willard Way" is the time-saving way!

"Wheel the right mix at the right time at the right cost to the right place with Willards."

WRITE FOR THE "WILLARD WAY" BOOKLET

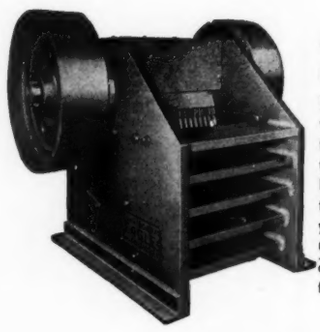
WILLARD CONCRETE MACHINERY SALES CO.
11700 Wright Road, Lynwood (Los Angeles County), Calif.

READY MIX *"the Willard Way"*

EAGLE'S NEW DESIGN GIVES YOU GREATER LOADING HEIGHT AND GREATER THROW

It's no problem to pitch the load onto any standard truck—even the higher ones—with Eagle's longer and higher conveyor.*

The farther throw of this longer conveyor (now 15') simplifies loading trucks immediately ahead of the Eagle. Raising or lowering conveyor can now be done hydraulically between 9' minimum and 11' maximum.



FOR ON-THE-JOB CRUSHING

Does a superior job!

Extra-heavy, one piece electrically welded construction is simple—good for years. All wear parts are extra tough steel, reversible for double wear. Incorporates a number of outstanding features described in folder 151-163, yours for the asking.

Comes in various sizes and models, including a roadside and trailer model for "on-the-job" crushing.

Send for details and prices!

*Extra length and hydraulic control are optional at slight extra cost.

EAGLE
JAW CRUSHERS • IMPACT BREAKERS
PULVERIZERS • CONVEYORS • LOADERS
CRUSHER CO., Inc. GALION OHIO·U·S·A

foot booms and 53-foot masts, were located on the superstructure, each over a pier.

As a girder was hoisted into position, each end was connected to a 70-foot cantilever arm which protruded from the superstructure, by a 13-inch-diameter steel pin. Two erection frames, one at each end, steadied the girders 30 feet from the pins until tons of floor beams, stringers, and bracing were erected.

Floor material to be erected was then picked off a barge in the canal and set in place. One traveler is now erecting all north approach steel from pier 31 to the hanger beyond pier 16, and next spring both derricks will erect the suspended span girders for the bridge.

Work on the span is being done under a prime contract by Bates & Rogers Construction Corp., Chicago, Ill. Steelwork is being fabricated and erected by Bethlehem's Pittsburgh Erection District under G. B. Shaw, Jr., manager of erection. E. E. Lewis and A. R. Brown are field engineers, and G. C. Kinneman is the superintendent for Bethlehem at the site.

THE END

Flexibility as a Factor In Soil Stabilization

■ An article that discusses flexibility as a factor in highway soil stabilization, is printed in the current issue of *Rubber Developments*, available without charge from the Natural Rubber Bureau, 1631 K St. N. W., Washington 6, D. C.

The article covers requirements of the subbase, use of bituminous emulsion, design of flexible pavement, increasing shear strength, and experimental work of various types. Pictures and diagrams illustrate this material.

To obtain this literature write to the National Rubber Bureau or return the Request Card at page 18. Write the organization's name on the card.

Portable Materials Hoist

■ The wheel-mounted Roll-o-Hoist material hoist is now being manufactured by the Sasgen Derrick Co., 3103 W. Grand Ave., Chicago, Ill. The tower was formerly made by the St. Anthony Machine Products Co., Minneapolis, Minn.

Literature describing the Roll-o-Hoist emphasizes the portability of the unit and points out that it can be used as a 32-foot self-supporting tower for work on "green" walls. The booklet also describes the material platform and bucket available for the tower, as well as the power units and the Stampco Tugger hoist that operate the raising mechanism.

To obtain this literature write to the Sasgen Derrick Co. or return the Request Card at page 18. Write the manufacturer's name on the card.

Conveyor-Belt Cleaner Made in Improved Design

■ The Stephens-Adamson spring-type conveyor-belt cleaner is designed to remove material adhering to the belt after discharge, thus preventing cover wear. Steel wiper blades set perpendicular to the belt surface but diagonal to its line of travel scrape off material, allowing it to fall to the discharge chute. Since the wiper blades are mounted on spring arms, pressure against the belt can be adjusted for different conditions.

Formerly, these spring steel arms exposed a flat surface to the dribble falling from the wiper blades, allowing some material to build up on the flat surface. To remedy this, the new belt cleaner design has a twist in the arm so that a vertical edge is exposed.

A new bulletin from Stephens-Adamson Mfg. Co., Aurora, Ill., describes the improved belt cleaner.

To obtain Bulletin 651 write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Hercules Buys Unisteel

Hercules Steel Products Corp., Galion, Ohio, which has purchased the Gramm Unisteel Body Division of the Gramm Trailer Corp., Lima, Ohio, will operate the division as the Unisteel Body Co. Executive direction of the division will be handled from Hercules' office in Galion, while manufacturing and sales operations will be maintained at Unisteel's plant in Wapakoneta, Ohio.

Hercules will continue to produce the Unisteel van body line.

Heavy-Duty Motor Grader

■ For contractors interested in a heavy-duty grader of the 115 to 125-hp class, the Galion Iron Works & Mfg. Co., Galion, Ohio, has released a new catalog on their Model 118 all-gear tandem-drive motor grader. This model now is available with either a 115-hp International diesel engine or a 125-hp General Motors diesel.

Operating and construction features are illustrated and described. Extra equipment, such as a hydraulically shifted moldboard and a creeper transmission, are also described in detail.

To obtain Catalog No. 395 write to the company or return the Request Card at page 18. Write the manufacturer's name on the card and return to CONTRACTORS AND ENGINEERS.

WAIT!...Before you buy

any concrete cutting blades . . .

Watch for the Amazing New "CLYDE" Duo-Bond Blades . . . for *ALL* Machines . . . at *Lowest Prices* ever offered.

Sensationally acclaimed on the Ohio Turnpike and other major paving projects.

Write THE CLYDE COMPANY, CE Division
P. O. Box 72 RACINE, WISCONSIN

So light a 3 year old can lift it!

This 2 H.P. gasoline engine weighs only 16 lbs.

. . . Imagine what this Power Products Lightweight can do for your equipment

Do a little "imagineering" in terms of your products! Wouldn't such dramatic weight savings create tremendous advantages in your equipment — make it easier to carry — eliminate heavy and costly frame structure, wheels etc.

Lightweight is only one of the many features of the amazing Power Products Industrial engine. Full information and specifications available on request.

Power Products Corporation
2005 N. 12th STREET, GRAFTON, WISCONSIN

Work at Tagokura Dam is being pushed in line with Japan's new electric power program—a program calling for the construction of a series of major dams in the country. Electric Power Development Co., Ltd., Marunouchi, Tokyo, here uses a Bucyrus-Erie 54-B crane for concrete-placing operations.

Loading earth into a waiting truck, this Model 820-K Lorain shovel assists in grading operations on the New York Thruway approach to Manhattan. The shovel is one of two such units used by Orlando Contracting Co., Whitestone, Long Island, N. Y., in moving 6,400 yards of material in 8 to 10 hours.

Officer Team to Direct Air Force Construction

A three-man team of U. S. Air Force officers has been named by Headquarters, USAF, to direct air force construction on a global basis. The officers are Col. Robert R. Connor, Col. Paul C. Brown, and Col. S. M. Lutz, Jr., formerly air force installations representatives in Dallas, Atlanta, and San Francisco, respectively. The headquarters of the new team is in the Pentagon, Washington, D. C.

The head of the group is Col. Connor. He will serve as director of construction and work directly under Maj. Gen. Lee B. Washbourne, assistant chief of staff, installations. Entering government service in 1929, Col. Connor served with the U. S. Army Corps of Engineers, Vicksburg, Miss. He was graduated from the Fort Belvoir Engineer School in 1938; became post engineer at Camp Blanding, Fla., in 1940; and district engineer, Liverpool, England. He was chief of staff, Caribbean Air Command, from 1949 to 1952, when he was made officer in charge of the Air Force Installations Representative office in Dallas, Texas.

Col. Brown began his engineering career with the Iowa State Highway Commission in 1924, and was with the engineering division of the U. S. Forest Service until the outbreak of World War II. After serving in the Corps of Engineers during the war, he became Air Force Installations Representative at Atlanta, Ga.

Col. Lutz worked on various phases of the development of the Colorado River Aquaduct from 1933 through 1937. Later, he was with the engineering staff of the Pennsylvania Turnpike Commission, and served in the air force during World War II, before becoming installations representative in San Francisco, Calif.

Marion Offers Two Films

Two new 16-mm color-sound movies featuring material-handling excavators in action are available from the Marion Power Shovel Co., Marion, Ohio.

The story of a shovel on two crawlers is told in "The Marion 191-M", and the company's entire line is featured in "Marion and You". The films are available gratis from the Marion advertising department.

Like these contractors, you can

Bid lower- Finish jobs faster- make more per contract

SPECIFY

GENERAL MOTORS DIESEL POWER

In all your construction equipment

"Works faster... burns less fuel... costs less to maintain."

That's what these contractors—operating *seven* different kinds of General Motors Diesel-powered equipment—report about their GM Diesels. They've got on-the-job proof that a GM 2-cycle Diesel does more work at less cost on every construction job.

If your business is building anything from sewers to skyscrapers, you'll find a good way to build your business is to *specify* a GM Diesel when you buy equipment.

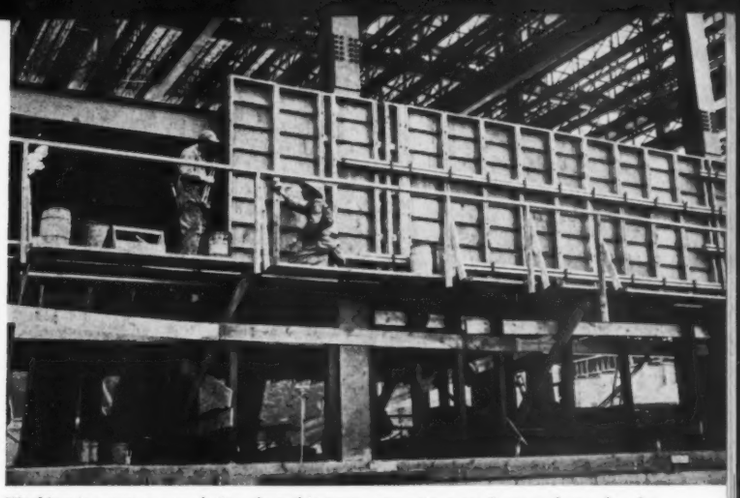
For this quick-acting 2-cycle Diesel accelerates faster under load, burns fewer gallons of low-cost fuel, stands up better even in toughest working conditions. You won't need service often but, when you do, your GM Diesel distributor backs up engine performance with fast service and quick delivery of low-cost parts, no matter where your contracts take you.

Today you can get GM Diesel power in over 750 different models of equipment built by more than 150 different manufacturers. Get their names from your local GM Diesel distributor or write direct for the list.

25% MORE WORK AT HA... THE FUEL COST

California contractors McGuire ... report they're getting 25% more ... and spending 50% less for fu... they converted this ¾-yard drag... *gasoline to General Motors Diesel power.* The compact "4-71" GM Diesel did such a good job that the contractor repowered two more shovels with GM Diesel.

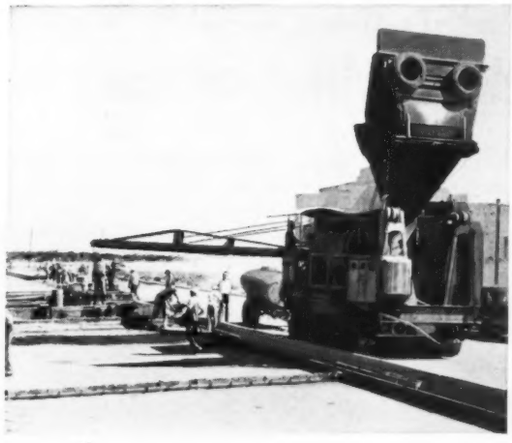
Steel traveling forms, 46 feet 6 inches wide and 28 feet 8 inches high, are used in lining the new Waldo tunnel at San Francisco. When the new tube is finished, the old tunnel will be used only for one-way traffic. The huge forms were designed and fabricated for the job by Blaw-Knox.



Working to meet a completion date this year, carpenters set Symons forms for the $2 million home-office building of the Minnesota Mutual Life Insurance Co. at St. Paul. Panels 2 × 8 feet wide are used to form 56,000 square feet of spandrel beams for the structure.

WORKS ⅓ FASTER—CUT FUEL COSTS 60%

Maryland contractor Charles F. Knox, Jr., reports he gets ⅓ more production, has cut fuel costs 60%, since he converted this ¾-yard shovel from *gasoline to GM Diesel power.* The shovel works 8 to 10 hours a day, costs far less to maintain. You can specify GM Diesel power in over 30 shovel models built by more than 20 manufacturers.



PAVES 1400 FEET A DAY

This Koehring Paver, powered by a compact, quick-accelerating GM 2-cycle Diesel, lays 1400 feet of 25-foot wide pavement per day for the Austin Road Company of Dallas, Texas. You can lay pavement faster and at less cost with GM Diesel power—available as original equipment in 8 paver models made by 4 different manufacturers.

"FASTEST DITCHER IN THE AREA"

McGuire & Hester *specified* GM Diesel power in two new Buckeye Ditchers and a Lorain Crane, as well as repowering a Hough Payloader, after getting *more work at less cost* with GM Diesel power in their dragline. The master mechanic calls this GM Diesel-powered Buckeye Ditcher "fastest in the area."

NO REPAIRS IN TWO YEARS

These GM Diesel-powered LeTourneau-Westinghouse Tournapulls worked over two years in flying abrasive dust without losing a day for repairs, reports Arizona contractor Link L. Colvin. In every kind of earth-moving equipment GM Diesel power lasts longer, works faster, costs less to run and maintain.

DETROIT DIESEL ENGINE DIVISION

GENERAL MOTORS • DETROIT 28, MICHIGAN

Single Engines . . . 30 to 300 H.P. • Multiple Units . . . Up to 893 H.P.

Blanchard Assigned to N. Y. Engineering Post

Carroll F. Blanchard has been appointed to the position of acting deputy chief engineer in charge of bridges, grade separations, and structures for the New York State Department of Public Works. He succeeds Edward W. Wendell, who has retired.

Mr. Blanchard has been associated with the department since 1921. He holds membership in the American Society of Civil Engineers, the New York State Society of Professional Engineers, and the New York State Association of Highway Engineers.

Another retirement in the department, that of Edward T. Gawkins, deputy chief engineer in charge of highways, parkways, and thruways, has brought about the appointment of Clair E. Smith to that position. Mr. Gawkins had been with the state for 43 years.

Mr. Smith, a department employee for the last 31 years, began as an engineering laborer. He has served as associate and principal civil engineer, assisting Mr. Gawkins in the department's Albany office.

Cab for Tractor Shovel

■ The new Crenlo cab for Caterpillar No. 6 shovels is described in a catalog sheet issued by Crenlo, Inc., Dept. KP, Rochester, Minn. A photograph of the cab and complete product specifications are included.

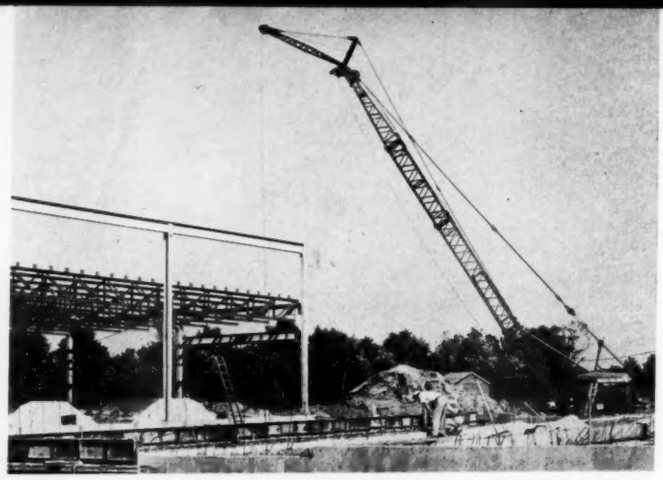
Advantages such as rugged design, wide visibility range, and simple installation are explained, and there are also optional accessories.

To obtain this catalog write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

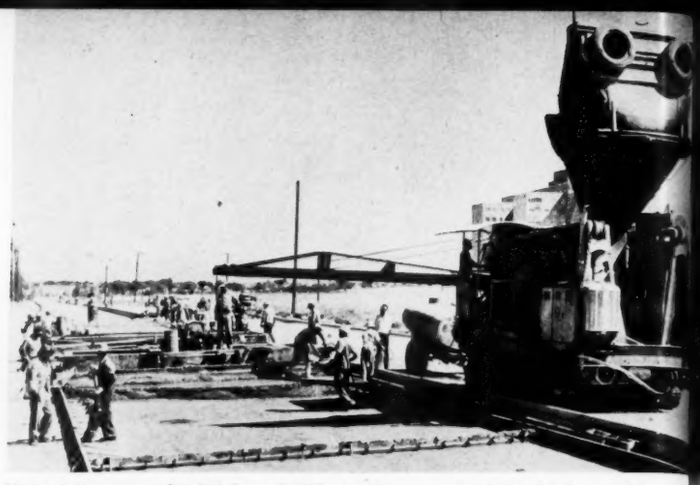
Catalog of Varied Line Features Wheelbarrows

■ A new catalog features descriptions and specifications for the complete line of wheelbarrows made by the Jackson Mfg. Co., Harrisburg, Pa. Catalog No. 44 also contains information on spreader carts, concrete carts, mixing boxes and mortar pans, drag scrapers, and coke and gas-fired salamanders.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.



Proving versatile in work on the Courier-Post's plant in Camden, N. J., is this Gar Wood 75B heavy-duty ¾-yard excavator. The machine took 6 hours to complete 18 footings 5½ feet deep and 38 inches in diameter, then moved ahead to erect steel for the building.



Maintaining a record 1,400 feet of 25-foot-wide pavement daily, this heavy-duty Koehring paver, powered by a General Motors 4-71 Detroit diesel engine, works on Lancaster Road just outside Dallas, Texas. Contractor on the 3-mile stretch of the two-way highway is Austin Road Co., Dallas.

J. Robert Bazley, Inc., Contractor, Gets Controlled Breakage with AMERICAN EXPLOSIVES

The right American explosives, properly placed and detonated, give contractors and mine and quarry operators the kind of controlled, clean breakage that assures efficient and profitable operations.

American Explosives, blasting caps and accessories are available in a wide range of densities, velocities and strengths to meet every blasting requirement. Plants and magazines in key locations throughout the country can fill your needs, and capable field engineers are available at your call. Make your next order American.

Contractor – J. Robert Bazley, Inc., Pottsville, Pa.: shaley formation mixed with seams of medium limestone. Fourteen blast holes averaging 71 feet deep drilled in a line 30 feet apart and 30 feet back from open face.

There she goes! Holes were loaded with American Container-Cartridges containing low speed, low sensitivity dynamite, detonated with Plastic Primacord* in each hole and hooked to a trunk line of Plain Primacord.

Notice the heaving, churning motion with which the rock flowed out. Flying rock is notably absent.

This clean, even breakage means easy shoveling and loading –another good shot with American Explosives.

THE AMERICAN LINE:

HIGH EXPLOSIVES
PERMISSIBLES
BLASTING POWDER
BLASTING CAPS
ELECTRIC BLASTING CAPS — (INSTANTANEOUS, REGULAR DELAY, SPLIT-SECOND DELAY)
BLASTING ACCESSORIES

*Registered trade-mark of Ensign-Bickford Co.

AMERICAN CYANAMID COMPANY EXPLOSIVES

AMERICAN Cyanamid COMPANY
EXPLOSIVES DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

Sales Offices: Latrobe, Pa., Pittsburgh, Pa., Pottsville, Pa., Scranton, Pa., Maynard, Mass., St. Louis, Mo., Bluefield, W. Va.

Campbell Engineering Co. Is Formed in Detroit

Charles C. F. Owens, Thomas J. F. Papez, and Charles C. Wieder are partners in a new concern, Campbell Engineering Co., Detroit, Mich. All three men were formerly engineers with the H. F. Campbell Construction Co., Detroit.

The newly organized company is engaged in design service for industrial, commercial, and institutional building construction. This service includes assistance in site selection, soil investigation, land surveys, establishment of building lines and grades, plant layout, and complete drawings and specifications.

Equipment Servicing And Maintenance Practices

■ A new booklet discussing modern servicing procedures has been released by Caterpillar Tractor Co., Peoria 8, Ill.

This publication has been written to help acquaint equipment owners with the latest service equipment, preventive maintenance practices, and methods that may be utilized to speed up emergency field service. To obtain Form No. D484 write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Lehigh Manager Named

A vice president of Lehigh Structural Steel Co., Allentown, Pa., George J. Neumann, has been appointed plant manager. With Lehigh since 1929, Mr. Neumann was elected a vice president and director of the firm in 1948.

He succeeds William H. Mohr, who has retired from active service but who will continue as a consultant and director of the company.

HUNT PROCESS
CONCRETE CURING COMPOUNDS
NOW AVAILABLE IN SOUTHEAST
Write for complete information
HUNT PROCESS CORP., SOUTHERN
RIDGELAND, MISSISSIPPI
Western Factory & Main Office
HUNT PROCESS COMPANY, INC.
7012 Stanford Ave., Los Angeles 1, Calif.

Drainpipe work at the $80 million Plattsburgh Air Base, N. Y., is handled by a Caterpillar D4 equipped with a PD4 pipe layer. Because of adverse soil conditions, about 63,000 cubic feet of muck had to be excavated for the trenches, pipe laid on a layer of sand, and trenches backfilled with sand.

Churning up dust, an International 2T-75 tractor-scraper combination is given a push-loading assist by an International TD-24 as it works on the U. S. 383 relocation job in Kansas. BP and VP Construction Co., Prairie View, Kans., is the contractor for this new flood-free section of the heavily traveled route.

Soil Science as Basis For Road Construction

The importance and use of pedology and soil science in road design and construction is treated with considerable detail in a new book, "The Scientific Basis of Road Design", by F. L. D. Wooltorton. Volume 14 in the Roadmaker's Library Series, the work is published by St. Martin's Press, New York, N. Y.

A pioneer in recognizing the importance of soil science in building roads, Mr. Wooltorton has here collected and analyzed for the first time soil information pertinent to low-cost road construction, and has carried his findings through to practical methods of design. Acting on the premise that local soil must be considered as the natural and cheapest road-building material, the author considers every phase of road design and construction.

Chapters are devoted to soil classification, chemistry, and physics; soil volume changes and other characteristics; selection of a design and suitable materials; and design and construction of subgrade, base courses, surface courses, and shoulders. The book contains many tables and diagrams, as well as a complete glossary and a detailed index.

"The Scientific Basis of Road Design" is priced at $12, and may be ordered from St. Martin's Press, 103 Park Ave., New York 17, N. Y.

Lamb Names Executive

Malcolm L. Wister has joined Robert E. Lamb & Son, Inc., industrial construction firm of Philadelphia, Pa., as assistant to Walter E. Lamb, president.

Formerly, Mr. Wister was with the Mulford Construction Co., Ardmore.

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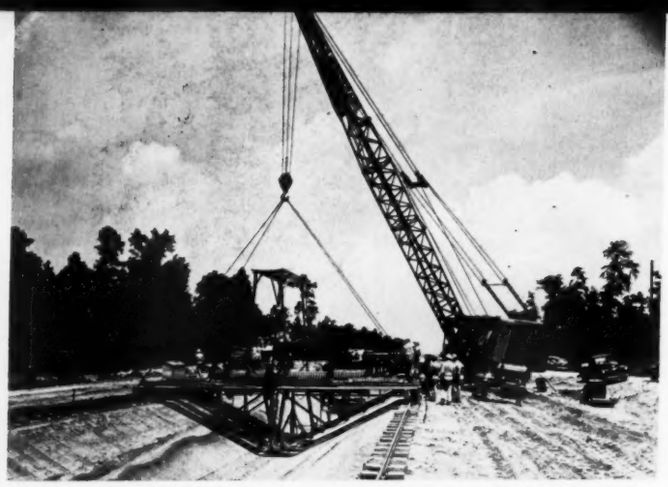

A giant machine designed by Brown & Root, Inc., Houston, Texas, for the construction of Houston's 13-mile water supply canal unreels and lowers lengths of welded wire fabric onto the canal bed prior to concreting. Heavy equipment on the job is handled by the Manitowoc Speedcrane.

The last lift for one of the three pier shafts being built for the Missouri River bridge at Leavenworth, Kans., is made as an American Revolver crane delivers concrete to the forms. The concrete used in pier construction was brought to a nearby pier by truck mixers.

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Failure of Pennsylvania Turnpike Resurfacing Is Attributed to Use of Large-Size Aggregate

Failure of a 4½-mile portion of a 22-mile job done last year on a stretch of the Pennsylvania Turnpike, according to a report from the Wire Reinforcement Institute, Washington, D. C., may lie with the size of the aggregates used on the job. The improvement (see "Asphalt Mix Resurfaces Worn Concrete Highway," C&E, Nov., 1954, pg. 72) consisted of a bituminous mix laid over the cement concrete pavement and reinforced with welded wire fabric; no reinforcing was used on the remainder of the project. The binder was 2 inches thick, topped by a 1-inch wearing course of asphaltic concrete. The reinforced section is on the westbound lanes, just west of the Somerset Interchange.

This section of pavement had to be stripped from the old cement concrete roadway last fall after pot holes had developed and the bituminous surface had raveled under the heavy volume of traffic on the roadway.

Reporting to the Wire Reinforcement Institute on the job, Charles M. Upham, Washington, D. C., highway authority and currently a transportation consultant to the Egyptian Government, said that "the binder used in this connection was the large aggregate binder which theoretically depends more on the interlock for density and stabilization than upon the bitumen binder." Because of the large aggregates used, Upham stated, "the wire reinforcement remained practically in contact with the concrete roadway surface. Many tests showed that only in a few instances did the reinforcing rise to ½ inch into the binder."

Generally, the steel reinforcing rises from ¾ to 1 inch from the existing pavement into the binder course. In this position, it most satisfactorily performs its function of controlling and minimizing deflection cracks and preventing a "shoving" of the surface. Records of successful jobs indicate that the maximum size stone practical for use in the bituminous

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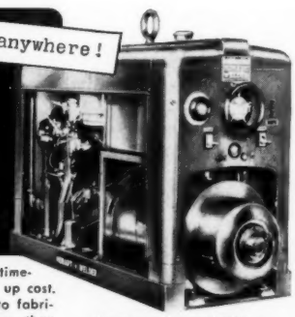

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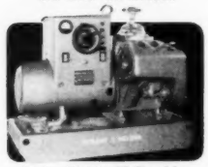

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Hydraulic power for raising a roof slab for the men's dormitory at Antioch College, Yellow Springs, Ohio, is supplied by two Vickers units. Lift-Slab Co., San Antonio, Texas, is the contractor.

Standard construction equipment such as the truck-mounted Chicago Pneumatic compressor and wagon drill are used in uranium ore exploration. Dust from a 300-foot-deep hole can be analyzed.

Assembly nears completion on the shield which is now driving the third Lincoln Tunnel tube under the Hudson River in New York. A total of 28 Watson-Stillman jacks around its edge will propel the shield forward.

mix is ¾-inch. On the Pennsylvania Turnpike job, stone sizes went as high as 1½ inches.

Upham attributed the difficulty to the fact that "reinforcing is more or less in a general plane, while the stones formed an irregular plane. When the surface was rolled, the planes came together, causing voids to develop in the binder. When these voids became full of water, heavy traffic on the section caused a churning action which stripped the stone of asphalt so that it lost its binding qualities."

Although the Wire Reinforcement Institute seconded Upham's opinion, it is not "discounting the possibility that other factors contributed" to this failure. Final conclusions regarding the resurfacing job will not be drawn until Upham's theory is confirmed by research. The institute hopes to substantiate its theory regarding the reason for the road's failure by conducting investigations of the problem in cooperation with turnpike engineers and highway officials throughout the country.

Cummins Engine Shifts Two Regional Executives

Appointments involving two regional managers have been announced by the Cummins Engine Co., Inc., Columbus, Ind., maker of diesel engines and electric generators.

M. W. Brooks, previously in charge of the industrial power division of the White Motor Co., has been named regional manager of Cummins' midwest district, Central Region, with offices at 707 Shell Bldg., 1221 Locust St., St. Louis, Mo. He will serve as company representative in Kentucky, Missouri, Iowa, Nebraska, South Dakota, northern Kansas, and southern Illinois.

H. A. Strohman, assistant regional manager of the Eastern Region, has been transferred to the new Middle Atlantic office at Harrisburg, Pa. With headquarters in the Hall Building, Second and Locust Streets, Harrisburg, he will act as Cummins' representative in Pennsylvania, Maryland, Delaware, southern New Jersey, western New York, and a part of northern Virginia.

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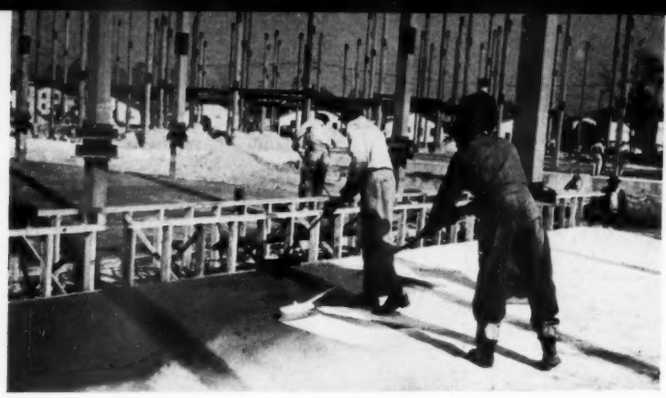

Workmen brush white parting sand onto the smoothly finished concrete surface so that slabs can be lifted easily. This sand, and the Techkote wax under it, will keep the slab from bonding with the next slab to be placed.
C&E Staff Photo

A THREE-YEAR expansion program involving up to $40 million in construction contracts will be completed this year at the U. S. Naval Amphibious Base, Little Creek, Va., transforming this 1,800-acre coastal site into the largest base of its kind in the world. Directed by the Navy's Bureau of Yards and Docks, the new construction also includes a considerable amount of dredging and grading, work on new piers, docks, buildings, roads, and a number of supporting facilities.

The base, about ten miles northeast of Norfolk, is located on a group of coves that fan out from an inlet on Chesapeake Bay. Until 1951, the area was used only for small-scale training. All of the buildings were of the temporary type, most of the coves were not navigable, and the land around the coves was broken up with large swamps.

By 1951, the threat of atomic warfare had emphasized the need for more amphibious training, and it was decided to begin an accelerated construction program at Little Creek.

Harbor Improvement

The first part of the plan consisted of harbor improvement, involving extensive dredging and pier work. When *Contractors and Engineers* visited the project, more than 8,500,000 cubic yards of material had been removed from the beds and sides of the coves to create new channels and basins. About 5,500,000 cubic yards of this amount was pumped back onto the base to fill in swamp areas. Except for 130,000 cubic yards, which was dumped into scows and wasted at sea, this material was deposited in spoil areas off the base.

This work was carried on by the Norfolk Dredging Co., Norfolk, Va., under two major contracts. The job was done by two 16-inch hydraulic dredges, the Charleston and the Pullen; a bucket dredge, the Atlantic; and a 27-inch dredge, the Philadelphia.

Forms Link for Cove

As soon as dredging was completed in the first few coves, contractors moved in and began work on the reinforced-concrete piers, quays, and ramps.

Diamond Construction Co., Savannah, Ga., and Norfolk, completed a $1,100,000 contract in 1953 calling for the construction of piers and ramps capable of servicing about 100 small amphibious craft. The contractor is now working on a similar job totaling $2,756,000

The McLean Construction Co., Baltimore, Md., has two major contracts under way—a $1,600,000 contract for the construction of four large piers and a ramp to handle LST's and a $2,883,000 contract for intermediate-type piers, ramps, and quays.

The small boat piers are generally about 120 feet long, 10 feet wide, and spaced on 90-foot centers. They consist of a 10-inch reinforced-concrete deck, poured integrally with the pile caps. The 14 x 14-inch precast piles, from 40 to 90 feet long, support the deck in 2-pile bents spaced on 10-foot centers. Every fourth bent has a third pile battered for stability.

All piers extend out from a bulkhead composed of capped precast-concrete sheet piles, 2 x 1½ feet in cross section, and 32 feet long. The bulkhead is anchored by 2-inch

"PAYD"* PLAN

Motor Scrapers at work on Washington County Airport in Pennsylvania

Job-Engineered Finance Plans

The rough shale and clay surface you see here will soon be transformed into 1,750 additional feet of smooth runway at the Washington County Airport in Washington, Pennsylvania. These two LeTourneau motor scrapers, obtained from Pittsburgh's A.T. Green Machinery Co., are helping contractor S. P. Lightholder of Canonsburg keep ahead of schedule on a 381,000 cubic yard earth-moving job.

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660 Market Street
Yukon 6-5454

A Rex truck mixer backs onto a portable ramp to chute concrete directly onto the slab. The narrowness of the barracks wings permitted the contractor to place all concrete by this method.
C&E Staff Photo

Harbor improvement and lift-slab barracks are part of $40 million program in Virginia

rods, 8 feet on center, tied to deadmen.

The large piers, each capable of servicing four LST's, are 420 feet long, 28 feet wide, and spaced 250 feet apart. Like the small boat piers, they consist of reinforced-concrete decks on precast pile bents. Piles are 20 inches square and placed 4 to a bent. The two outside piles are set plumb and the two inside piles are offset and battered in opposite directions. Bents are about 14 feet apart. Below the 9-inch deck, a concrete tunnel carries water, steam, fuel, and air lines out to the ships.

Along the water's edge, an incline ramp 31½ feet wide is built to service the LST's through their forward openings. The ramp is supported on 16 x 16-inch piles and is connected to a precast bulkhead similar to the one used at the small boat piers.

Pile Precasting

Both the McLean and Diamond organizations precast their own piles for the pier work. McLean already has a casting yard on Hampton Roads which was used on previous work at the Norfolk Naval Base. All of its piles are made there and shipped to Little Creek on barges.

Diamond casts piles on the Little Creek base adjacent to the job. The contractor cleared an area near the cove, laid a series of 2-inch wood soffits, and set up a Wiley Whirley to do all the heavy handling.

Using the 2-tier system, Diamond's casting crew turns out about 170 piles a week. The first step is to pour a tier of 30 to 50 piles on wood soffits and between retractable steel forms. The soffits for the 14-inch piles are set 6⅞ inches apart, providing the proper space for a set of retractable forms. A steel frame suspended from the Whirley handles four sets of forms at the same time. When the forms are in place, prefabricated reinforcing cages are placed inside. Reinforcing bars with clips welded to them are then set across the tops of the forms, keeping them in place during the pour. The cages are also hung from these rods.

Ready-mix concrete is loaded into Whiteman power buggies, carried up a portable ramp, and dumped directly into the forms. After two days, the forms are retracted, moved on top of the previously poured piles, and positioned. Paper is placed on top of the bottom pile to insure easy separation when the top pile is removed. The concrete is placed as before, and a higher ramp is used by the buggies. Two days later, the process is repeated with the third tier of piles. After 21 days, during which the three tiers are continually cured with water, the Whirley picks up the piles and stockpiles them near the job. The soffits are then used to start another three-tier group.

Driving Piles

McLean places and drives all of his precast piles inside steel and timber templates which act later as falsework for the deck forms. Each template is 60 feet long and provides space for four bents. The sides are double 18-inch steel beams, and the cross pieces are 12 x 12 timbers. As soon as one template is filled with piles, another is brought out and hung between the previous template and two H-piles which are driven further out in the water.

The precast piles, from 57 to 67

Paving the way for the new tax laws on depreciation, a House Ways and Means Committee report (HR No. 1337) stated, "The average machine . . . actually depreciates considerably more and contributes more to income in its early years of use than it does in the years immediately preceding its retirement."

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A precast pile for one of the LST piers is jetted by a Wiley Whirley. A steel and timber template used to locate the piles also serves later as a falsework for the deck forms.

C&E Staff Photo

(Continued from preceding page)

feet long, are picked up from the barge by the Whirley, using two lines. One line is lowered, up-ending the pile, and the other sets the pile in the template. Bolts through the 12 x 12's locate the pile in position.

When the pile sinks as far as it can under its own weight, a 5-inch pipe, nozzled down to 1¼ inches, is placed alongside the pile to set it as far as is practicable. A Griffin pump, powered by a General Motors diesel, pumps water through the pipe at 250 psi. Finally, a Vulcan No. 0 hammer drives the pile to firm bearing. When all the piles are in, conventional forms are set over the timber template, and the caps and deck are poured together. Ready-mix concrete is dumped into 5-yard buckets handled by the Whirleys.

Lift-Slab Barracks

In addition to the harbor improvement, many other projects are under way on the base itself. An enlisted men's school and training center was started recently under a $1,857,000 contract awarded to the Lang Construction Co., Inc. Hampton, Va. The same contractor also has two enlisted-men's barracks under way. One is a 1,500-man structure for $1,687,000 and the other is a 900-man unit for $1,037,000. The gross floor area of the 1,500-man barracks is 215,000 square feet. Both barracks are being constructed by the lift-slab method, a new feature to the Norfolk area.

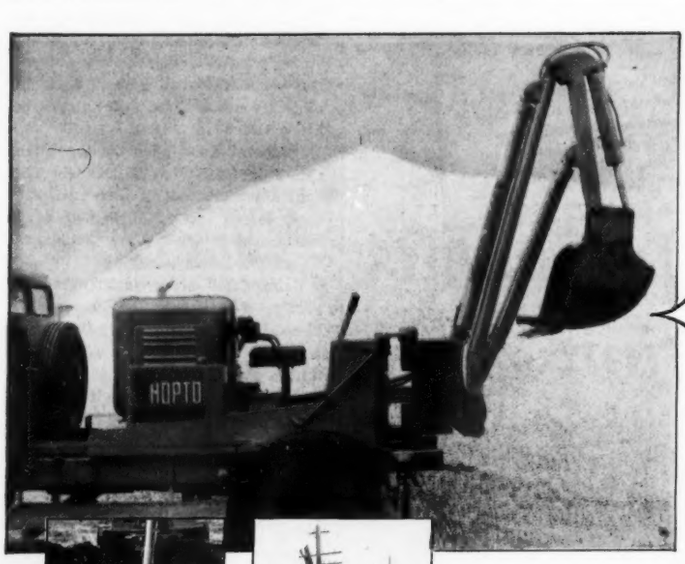
The 1,500-man barracks consists primarily of two parallel wings, each of which is three stories high. These wings are 477 feet long and 50 feet wide between columns. A third parallel wing is 245 feet long and 36 feet wide. The three parallel units are connected by two more wings, both 36 feet wide. In the main wings, bays are 22 feet × 20 feet. The three floors are 9 inches thick and the roof, 7½ inches. Each floor has a 4-foot sloping overhang around the exterior of the building. All columns are set on concrete footings supported by Raymond step-taper piles. These columns are square, made of two 8 × 8 × ½-inch angles welded along the seams.

Basically, the lift-slab method used on the barracks consists of erecting all the columns, pouring the three floors and the roof at ground level, setting jacks on top of each column, and then lifting the various slabs to their proper heights.

The first-floor slab was the only stationary slab. It was poured directly on highly compacted select material and tied to the exterior concrete walls by steel dowels spaced on 10-inch centers. The columns were cross braced during the pour to keep them plumb.

After the first floor was poured, it was given a smooth finish with hand trowels, Whiteman finishers, and Kelley floats. The smooth surface was necessary to prevent bonding of the slabs when they were lifted. As a further assurance, Techkote compound was put on top of the slabs and covered with white parting sand.

After one week, the second floor



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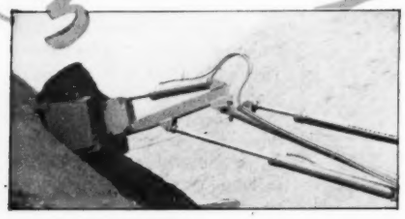

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Model SPC HOPTO is a complete Badger-built unit powered by an MM 206-4A. Other power units can be furnished on request. Unit has a bearing pressure of only three pounds per square inch to permit uninterrupted operation in swampy or muddy soils. Comfortable seat for operator swivels for easy access to operating and driving controls. Extremly long reach permits all HOPTO models to work all of a thirty-two foot semi-circle without moving unit.

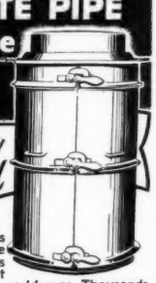
Write TODAY *for complete information and specifications of the HOPTO model that best fits your needs!*

BADGER MACHINE CO.

WINONA, MINNESOTA • DEPT. E

For the FINEST CONCRETE PIPE You Need the FINEST FORMS!

THE "Quinn" Standard



Backed by over 40 years of reliable service, the QUINN STANDARD is recognized as the finest concrete pipe form the world over. Thousands of pipe manufacturers, from the smallest to the largest, look to Quinn for equipment to produce the finest concrete pipe at the lowest possible costs.

• QUINN HEAVY DUTY PIPE FORMS

For making pipe by hand methods by either the wet or semi-dry process. Sizes for pipe from 10" to 120" and larger. Tongue and groove or bell end pipe in any length desired.

WRITE TODAY for complete information and estimates.

Also manufacturers of
QUINN CONCRETE PIPE MACHINES

Quinn WIRE & IRON WORKS
BOONE, IOWA

Wedges maintain the required space between the column and the lower cast-iron lifting collar while the second floor slab for the barracks is placed. Lead plugs covering holes in the collar will keep out concrete.
C&E Staff Photo

was poured on top of the first. The lifted slabs were cast in sections about 70 feet long and 52 feet wide. In other words, six bays were lifted from twelve columns.

Casting Lift-Slabs

To prepare for pours, large cast-iron lifting collars were set around each column and positioned with wedges. Heavy grease was placed in the space between column and collar to keep out concrete. Concrete also had to be kept out of the holes in the collar through which the lifting rods are inserted, and to do this, Lang simply placed two grease-covered lead plugs in the holes. When the concrete had set, they were pulled out.

When the collars, reinforcing, utility ducts, and wood bulkheads were in place, ready-mix trucks backed up on portable ramps and chuted the concrete directly onto the slab. The narrowness of the wings made it possible to chute all of the concrete directly from trucks.

The surface was first struck off with a wood screed which was moved back and forth over 1-inch pipe-guides mounted on chairs. When an area was finished, the pipe guides were removed and used in another section. One week later the third floor was poured on top. Lang averaged about 11 slabs a week.

Eastern Lift-Slab Co., Inc., raised the slabs to their proper height. Special hydraulic jacks were set on top of twelve columns, and threaded rods were placed on either side of the columns and fastened to the lifting blocks cast in the slab. Lifting speeds up to 8 feet per hour were made. When each slab was raised into position, it was held by 6-inch seat blocks welded to the faces of each column under the lifting collar.

As sections of the building were raised and anchored, the contractor placed the aluminum panels for the exterior walls. Sash was set in the panels, providing continuous windows along the sides. The ends of the wings were placed as solid concrete walls.

Personnel

P. Key is superintendent for Lang Construction Co., E. Rose is superintendent for Diamond Construction Co., and H. Campbell is superintendent for McLean Construction Co.

The District Public Works Officer, Fifth Naval District, Capt. A. J. Fay, CEC, USN, is the officer in charge of construction for the project.

THE END

Line of Pipe Pushers

■ Hand and power-operated pipe pushers are shown in a folder from the Greenlee Tool Co., 2136 12th St., Rockford, Ill. The Greenlee equipment is designed to push pipe under concrete pavements, railroad tracks, and sidewalks without the need for digging a trench, backfilling, or tamping.

The units are offered with six working speeds for various sizes of pipe and different soil conditions. Hydraulic power for the tools ranges from 6,500 pounds to 75 tons, and the units can handle pipe from ¾ inch in diameter to 4-foot concrete casings.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Portable Core Drills

■ A new bulletin describing its portable line of LD and LLD powered core drills is available from the Acker Drill Co., 725 W. Lackawanna Ave., Scranton, Pa. The Model LD combines into a compact unit a standard power plant, a built-in cathead hoist, a pump, a three-speed transmission, and a rotary drill head with hand-lever feed. The Model LLD is a lightweight unit without a pump, hoist, or three-speed transmission, but with the same rotary drill head as the Model LD.

Both models are suitable for making highway test cores and for soil sampling.

To obtain Bulletin No. 21 write to the company or return the Request Card at page 18. Write the manufacturer's name on the card.

ADAMS

Motor Grader with Elegrader

Plows and loads clay at rate of 10 yards per minute

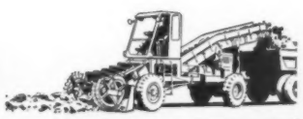
The Adams Motor Grader-Elegrader combination pictured above is owned by a prominent contractor. It is shown here loading fill material out of a borrow pit. Cutting up to 24″ deep and 12″ wide, the outfit plows clay and loads trucks at the rate of 10 yards per minute.

On such jobs as loading, stripping, casting in new roads, terracing, etc., this great Adams combination is unsurpassed for economy of operation, ease of handling and dirt-moving ability. On jobs where it has no application, the Elegrader can be easily removed and blade put on for normal grading operations.

Let your local dealer show you how an Adams Motor Grader with Elegrader will step up production, cut costs and increase profits for you.

J. D. ADAMS MANUFACTURING CO. · INDIANAPOLIS, INDIANA

ADAMS



Motor Graders TraveLoaders Pull-Type Gr

MOVE IT YOURSELF

WITH A BIRMINGHAM

LOWBED TRAILER

Contractor moving large ditching machine with Birmingham Trailer Model 835 FLR.

There is a design and model of Birmingham Lowbed Trailer to haul your concrete mixers, bulldozers, power cranes, road scrapers, dirt movers, ditching machine or any heavy equipment. They're built rugged for the big loads.

SEE OUR DISTRIBUTOR OR WRITE FOR DETAILS

BIRMINGHAM MANUFACTURING COMPANY, INC.

P. O. Box 1351, Birmingham, Alabama

Blasts drop tall stacks accurately in busy yard

At the Terminal Island steam plant of the Southern California Edison Co., expert demolition work has reduced to a pile of rubble one of the main powerhouse buildings and four 22-foot-diameter smokestacks—two of them 180 feet in height. Demolition of the stacks called for precise high-explosives work by Emsco Concrete Cutting Corp., Los Angeles, which did the job under a $110,000 contract with Southern California's Edison Co.

Since early last year, Edison has been removing three obsolete turbines, installed in 1911, 1912, and 1915, together with 32 boilers and other old equipment and facilities. Final work to remove the stacks and clear the land is now underway. When the project is completed the No. 1 plant will contain only the three newer turbines which were installed in 1924. These units will receive steam from Edison's Long Beach Plant No. 2.

The three old units in the company's Long Beach No. 1 plant were removed because their useful life is past. They were becoming expensive to maintain and operate, and were no longer economical in the production line. Generating capacity lost by the removal of these units is being made up at the company's new Etiwanda Steam Station, the new Redondo plant, and elsewhere in the system.

Hazardous Work

Since two of the stacks were 180 feet high and the other two were 160 feet in height, and all were nearly 30 years old, their demolition was a hazardous undertaking. Large-diameter water lines, high tension wires, and other powerhouse equipment was scattered over the yard area. After careful consideration, officials decided that it would be no less dangerous to attempt demolition of the structures in place than to gamble on expert high-explosives shooting to drop the tall stacks across the yard. After being assured by Emsco's demolition experts that the stacks could be shot down so they would fall safely away from the powerhouse property, Edison officials gave the green light to the latter scheme.

So important was the explosives work that it was placed under the personal supervision of W. V. Cornett, president of Emsco, and E. B. McCollum, explosives expert familiar with important uses of powder in connection with masonry demolition. After examining the four stacks carefully, the two men began a step-by-step program of preparing for the job.

The stacks were first weakened at their base near the ground line by cutting 3 × 3-foot openings through the 8-inch concrete walls with hand-held air tools, supplied with air by a Gardner-Denver air compressor, and moil points. These "windows" were cut into the side facing the direction in which the stacks would fall. This preliminary cutting was limited to one half of the stack, leaving the other half intact.

With the same compressor and a small jackhammer, undisturbed con-

Power with INTERNATIONAL to Cut Production Costs

SURE THING FOR SHOVELS. The INTERNATIONAL 203 horsepower UD-1091 diesel engine that powers this Koehring No. 205 shovel is one of 18 IH engines that keep production high, maintenance low on everything from the big dippers to rock crushers, from motor graders to generators.

Specify an INTERNATIONAL engine—first choice of more than 200 leading equipment manufacturers

INTERNATIONALS are first choice of more than 200 leading equipment manufacturers because:

1. They power machines at peak efficiency for years and for minimum maintenance and operating cost—features of IH heavy-duty engines for more than 50 years.
2. They have unsurpassed parts and industrial application service support in the field—from INTERNATIONAL Industrial Power Distributors backed up by IH Parts Depots and IH field service engineering—features that mean maximum production for the long life of the engine.

So it will pay you to specify IH engines as original equipment and replace with IH, when it's time to repower. Get the full facts on how you can cut operating costs on your equipment by putting in an INTERNATIONAL. There are 18 diesel and carbureted engines in the IH line that ranges from 16.5 to 214 horsepower at useable speed—each a pay-off power plant in its own class.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL® INDUSTRIAL POWER

MAKES EVERY LOAD A PAYLOAD

Cuts in one-half of wall at base of concrete structures determines direction of fall in crowded powerhouse area

Carefully placed dynamite charges, along with openings cut in the wall near the base, drop this 180-foot concrete stack.

Ray Day Photo

crete sections between the 3-foot openings were drilled on 6-inch centers and loaded with small charges of a fraction of a stick of 60 and 40 per cent Hercules gelatine-type powder. Powder content for each of the stacks never exceeded 12 pounds. The purpose of the high-velocity explosive was to kick the remaining concrete loose instantly from the side of the stack in which the direction of fall was desired. By instantaneously weakening this side, Emsco could start the top of the stack toward the ground in a safe direction.

Protective Sand Wall

After the 3-foot "windows" were cut, the holes drilled, and the powder loaded, a ring of sand was built up to surround completely the "windows" and the explosives charges. This was done both to guard against flying particles and to confine the shot. At the same time, a 75-cubic-yard pile of sand was stacked in the yard near the point where the top of the stack was expected to fall. This sand pile would act as a cushion and help break up the stack when it hit the ground.

Each shot, after being examined by Cornett personally, was fired by a Hercules 50-cap blasting machine in the hands of McCollum. The signals in all cases were given by Cornett. All four stacks were dropped safely and accurately.

A Northwest truck-mounted crane with an Owens clamshell bucket was used to pick up the old rubble, which was then trucked to a dump ground about two miles from the site. One of the existing powerhouse buildings, approximately 80 × 100 feet in size, also is being demolished by the company. This is a conventional job for jackhammers, compressors, the Northwest truck-mounted crane, and a breaking ball.

THE END

Siebring AUTOMATIC HEATMOBILE

MODEL 101

PORTABLE OIL-GAS FURNACE
Makes Construction Easier

Ideal portable or stationary heat for outside jobs, buildings under construction, industrial plants, and numerous hard-to-handle heating problems. Instant heat, excellent circulatory system. Completely wired and tested at factory—no costly installation. Heats buildings 60' x 40', equipped with Honeywell automatic heat controls. Low initial cost and high operating efficiency.

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Dept. CE-1

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Amazing low price puts TRUCK TRACKS within the reach of every truck owner.

STANDARD SINGLE AXLE SETS
for tire sizes up to 9.00x20 $220 per set
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Sizes available for ALL heavy duty single and dual tires. Write, Wire or Call for prices.

VERSATILE . . .
Super traction for single as well as tandem axle trucks. Fit almost all standard rear duals.

EVERY PAD A MASTER LINK . . .

Adjustable bolt on every pad assures perfect fit, correct track tension.

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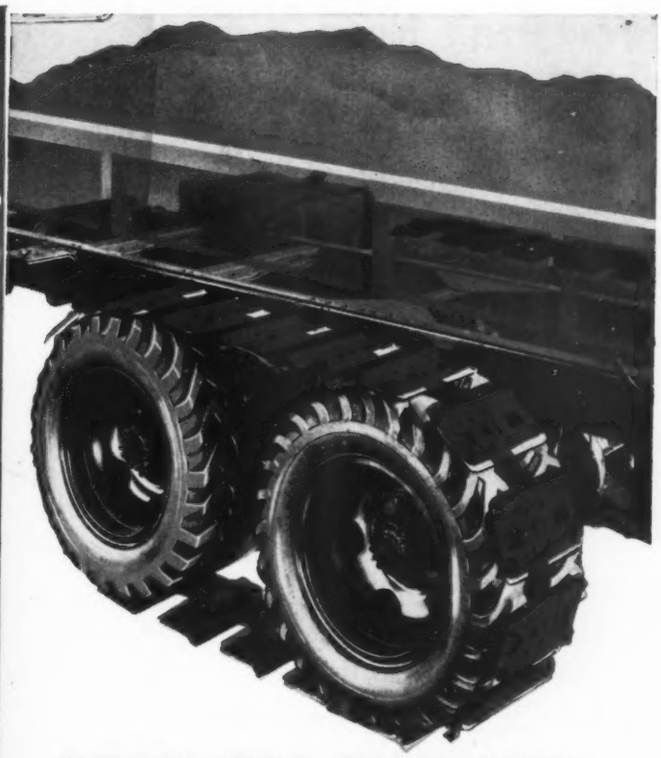

STAY ON THE JOB
Weather or No!

Beat the Mud and Snow this winter . . . mount TRUCK TRACKS on your rolling equipment. TRUCK TRACKS can eliminate seasonal shutdowns on the job by adding *tractor performance* to your trucks. Ideal for desert operations the year 'round.

Drivers mount TRUCK TRACKS in 10 minutes time; remove them in less. Adjustments are simple and easy to make. Nothing to break, bend or loosen . . . maintenance is negligible.

PROMPT SHIPMENT...TRUCK TRACKS are easy to order. All you have to do is specify tire sizes — single or tandem-axle — and send shipping route instructions. Standard terms to well rated accounts; others please accompany your order with 25% deposit per set and your TRUCK TRACKS are shipped at once.

P & G SUPPLY CO., 2262 N. Albina, Portland 12, Oregon Dept. 2A

☐ Please ship C.O.D. immediately:

_____ Sets of TRUCK TRACKS for Single/Tandem _____ x _____ tire size.

☐ Deposit check enclosed.

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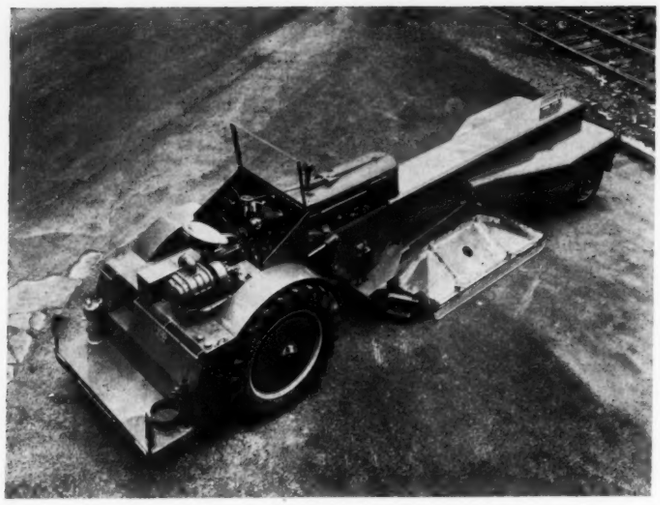
Shipping Instructions _____



The new Littleford-Clarkmoore asphalt road Heater Planer is designed to cut labor costs substantially on bituminous road repairs.

New Model Heater Planer Cuts Labor Costs Of Reconditioning Asphalt Roads, Runways

The latest addition to the Littleford line of road-building equipment is a new model Littleford-Clarkmoore asphalt road Heater Planer. The machine is designed to condition bituminous roads, streets, and airport runways, and eliminates many costly hand-labor operations.

In one operation, this Littleford-Clarkmoore equipment planes a pass as wide as 81 inches in depths from a skin cut to one inch. Working speed varies from 8 inches to 88 feet per minute, while travel speed is as high as 20 mph.

Hydraulic operation makes the action of the blade and surface heater simple and efficient. Power comes from an International four-cylinder water-cooled engine with a 364-cubic-inch displacement. One engine and transmission operate the controls and propel the planer. There are five forward speeds. The engine maintains a constant speed of 1,200 rpm when planing.

Dimensions of the Littleford-Clarkmoore asphalt road Heater Planer are: over-all length, 28 feet 5 inches; width, 82 inches; wheelbase, 20 feet.

For further information write to Littleford Bros., 485 E. Pearl St., Cincinnati 2, Ohio, or circle 200 on card at page 18.

Set of Standard Business Forms for Contractors

A complete set of uniform construction forms intended for use on municipal engineering construction projects has been published by the National Joint Cooperative Committee of the Associated General Contractors of America, Inc., and the American Public Works Association.

Developed by experienced contractors and municipal administrators and approved by both associations, the forms include an invitation for bids, instructions to bidders, bidder's proposal, contract or agreement, and general conditions of contract.

The language and arrangement of the documents are designed to provide easily understood forms which avoid highly technical or legal terminology.

The set, entitled Uniform Public Works Engineering Construction Forms, is priced at 25 cents, $2.75 for 12, or $20 for 100, and may be obtained from the AGC, 1227 Munsey Bldg., Washington 4, D. C.

Wayne Representative

The new western district sales representative for the Wayne Crane Division of the American Steel Dredge Co., Fort Wayne, Ind., is Conrad Hjalmarson.

A graduate mechanical engineer, Mr. Hjalmarson will have headquarters in Los Angeles. Before representing the manufacturer of heavy-duty power shovels, he served as a construction superintendent for a number of firms, both in this country and abroad.

You Don't Need . . . An Air Compressor with SYNTRON

Speeding progress of drainage project

New Model PB 55

"100% Self-Contained"
GASOLINE HAMMER
Paving Breakers and Rock Drills

2000 powerful blows per minute make short work of breaking, cutting, tamping or drilling—keep construction time and costs down. Rock Drill models have self-rotating bit.

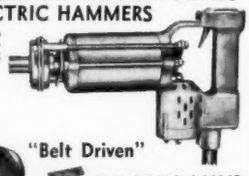
SYNTRON POWER TOOLS That Reduce Time And Costs On Construction Jobs

CONCRETE VIBRATORS

Mass and form types for high speed compacting and settling of large, medium or small concrete jobs.

"Self-Rotating" ELECTRIC HAMMER DRILLS and ELECTRIC HAMMERS

For fast, easy cutting, chipping, pointing or drilling in concrete. Ten times faster than by hand!



"Belt Driven" ELECTRIC SAWS

Deliver full cutting power to the blade—no bucking or jerking when cutting wood, tile, concrete block, plaster board, etc. 8" and 10" blades—2-13/16" and 3-1/4" cuts.

Write today for complete tool catalogue—Free

SYNTRON COMPANY
227 Lexington Ave. Homer City, Pa.

McGEE MADE Angle Dozer
Scraper—Hydraulic Steering

See Your Local
FORD-FERGUSON-OLIVER-JOHN DEERE
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LELAND T. McGEE MFG. CO., INC.
410 Dixon Ave., Compton, Calif.

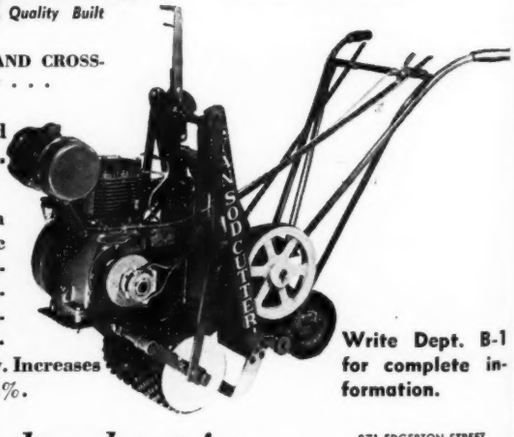
WATCH for the newest . . .

Ryan POWER SOD CUTTER
Quality Built

ONE MAN CUTS AND CROSS-CUTS automatically . . .

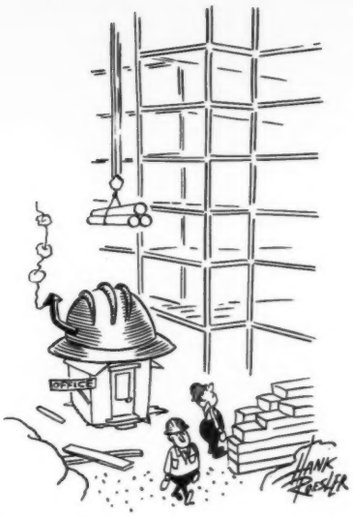
25 sq. yds. of sod per minute . . . ready to load!

The New Ryan with automatic cut-off unit eliminates all cross cutting! Reduces labor costs. Improves sod quality. Increases profits up to 35%.



Write Dept. B-1 for complete information.

Ryan landscaping equipment company
Quality Built
Division of K&M Machine Works, Inc.
871 EDGERTON STREET
ST. PAUL 1, MINNESOTA
TOWER 5256



McKendrick Heads New Blaw-Knox Division

Robert P. McKendrick has been promoted to vice president and general manager of the Blaw-Knox Co.'s construction equipment division at Mattoon, Ill.

Associated with Blaw-Knox since 1927, and head of the construction equipment division since 1946, Mr. McKendrick will remain at the company's headquarters in Pittsburgh, Pa., until the Mattoon plant is completed.

The new B-K plant will combine three widely scattered plants which now make steel road forms, cement and aggregate-batching plants, concrete and asphalt paving mixers, and allied road-building equipment. The new facility is being built on a 40-acre tract and is scheduled for completion next year. When it is placed in operation, the Blaw-Knox plant at Nunda, N. Y., will be closed.

Mobile Hydraulic Crane Mounted on Wheel Tractor

■ An illustrated bulletin describing its indoor-outdoor hydraulic crane has just been issued by Austin-Western Co., 601 Farnsworth Ave., Aurora, Ill. The Austin-Western hydraulic crane is a highly mobile wheel-tractor-mounted unit.

Included with specifications and performance data are diagrams on working ranges, manual boom extensions, and minimum aisle widths for turns.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Caterpillar Organizes Brazilian Subsidiary

A second foreign subsidiary has been formed by the Caterpillar Tractor Co., Peoria, Ill. The new organization will be located in Sao Paulo, Brazil, and will operate under the name of Caterpillar Brasil S. A.—Maquinas e Pecas.

The new company will be given all the Caterpillar technical assistance necessary to assure production equal to Caterpillar standards. Fewer than a dozen Americans will be transferred from Caterpillar plants in the United States to work at the plant. A maximum of Brazilian supervisors and workers will be employed.

The new subsidiary will be headed by Robert J. Loskill, formerly sales development manager at the Peoria plant. He will be assisted by John H. Smith, chief engineer; E. J. Sluetz, purchasing agent; W. R. Van Order, treasurer; B. W. Oedewaldt, parts manager; and Octavio Reis, buyer.

PCA Names Engineer

Malcolm S. Loring has been appointed district engineer of the Boston, Mass., office of the Portland Cement Association. He replaces F. E. Votaw, who has retired after 20 years' service.

Starting as a field engineer in the Philadelphia office of the association, Mr. Loring later served in the same capacity in the New York and Boston district offices. In his new post, he will be responsible for association activities in Massachusetts, Maine, Vermont, New Hampshire, and Rhode Island, and will work under the direction of M. J. McMillan, eastern regional manager.

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Foundation Investigations — Laboratory Analyses and Evaluation of Construction Materials — Soil Mechanics, Concrete and Asphalt Technology. Field Inspection and Consultation.

Special Investigations for Dams, Turnpikes and Airports.

710 North Brookfield, South Bend 28, Ind.

THE NEW UNIVERSAL 293Q TWINDUAL PACEMAKER

combines peak production with maximum portability

TOP CAPACITY PRODUCTION

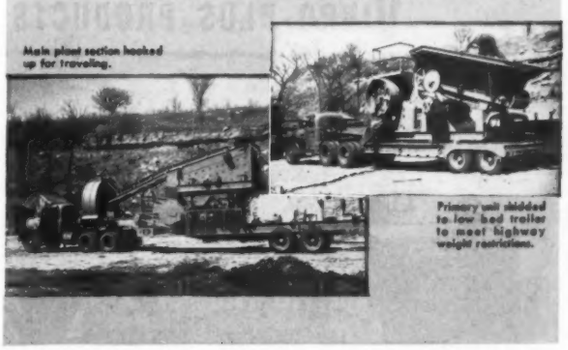
The TwinDual Pacemaker gives you three full stages of reduction for top capacity—a Universal overhead eccentric jaw crusher in the first stage and a TwinDual roll crusher for the second and third stages.

No other single unit plant offers so many big-profit advantages. Big primary jaw crusher accepts large rock—lets you work gravel pits containing big boulders. Exclusive TwinDual two-stage roll crusher gives top capacity secondary crushing. Its high ratio of reduction permits the primary jaw to operate at 50 to 100% wider discharge opening. This results in greater capacity—less jaw wear. Larger inclined gyrating screens with full screening area allow 20 to 25% greater output. All operations from apron feeder to delivery conveyor are driven through one single power unit.

For top capacity with three stages of reduction—and a bonus in longer crusher life, lower horsepower requirements and a better quality finished product, choose a Pacemaker. Available in five models for pit or quarry operation. Get complete profit making facts now.

LOW TRAVELING WEIGHT

The primary jaw crusher, apron feeder with grizzly by-pass, operator's platform and structural supports are all mounted as a single unit on skids. This primary unit is bolted to the main truck frame. When highway weight limitations must be met, this unit may be quickly skidded to a low bed trailer and transported separately.


Main plant section hooked up for traveling.
Primary unit skidded to low bed trailer to meet highway weight restrictions.

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UNIVERSAL ENGINEERING CORPORATION

620 C Avenue N. W., Cedar Rapids, Iowa

Subsidiary of Pettibone Mulliken Corporation, 4700 W. Division Street, Chicago 51, Illinois

EXCAVATING EQUIPMENT

This is the eighth and last in a series of articles made up of excerpts from a new book, "How To Operate Excavation Equipment", by Herbert L. Nichols, Jr., published by North Castle Books, Dept. N, 212 Bedford Road, Greenwich, Conn. Priced at $2.50 for cloth and $3 for de luxe leatherette binding, the book may be obtained from the publisher or through the Book Order Department of CONTRACTORS AND ENGINEERS, 470 Fourth Ave., New York 16, N. Y.

Smaller Equipment

THE ROCK DRILL is carried to the work area and connected to a flexible air line from the compressor. A short starter steel, from 12 to 30 inches in length, is fitted with a bit and clamped in the chuck. This bit should be the largest size which is to be used in the hole.

The area surrounding the hole should be free of dirt and litter that would interfere with starting the hole or slide into it during drilling.

Whenever possible, holes should be drilled vertically. This puts the weight of the hammer on the bit instead of on the operator, and simplifies keeping the hole straight.

A drill is built of special steels and is very finely machined throughout. It costs about five times as much per pound as a shovel or dozer, and it deserves much better care than it usually gets. A drill needs periodic cleaning, the interval depending on the quality of air it receives. An oil-pumping compressor, very hot air, or deteriorated hose may foul it in a day or less. With clean air it may function well for weeks.

Wagon Drills

A standard wagon drill consists of a wheel-mounted main frame or chassis, a support which can be raised or lowered, and a mast or guide shell. The drill is mounted on a slide on the mast and is moved along it by a roller chain driven by an air motor.

The major problem in wagon drill operation may be in getting it into working position. Its weight of 600 to 2,000 pounds, and its small wheels, make it difficult to maneuver.

On level ground it may be shifted by several men. It can be moved over bumps or up grades by putting a steel in the drill, setting the mast at a low angle, and using the feed-down pressure to push it, while the draw tongue is held in steering position.

In more difficult places, it may be towed by a tractor, truck, or winch line, or lifted and placed by a shovel or crane.

If the hole is to be drilled at any angle other than straight down, the wagon is placed facing the direction of drilling. The peg points should be set to resist backward thrust.

Ripping Ground

A heavy rooter may be used with all three teeth, with the center tooth only, or the side teeth only. Use of all the teeth produces more thorough breakage of the soil as the rooter works a strip approximately as wide as the towing tractor. Use of the outer

NEW METHOD . . .

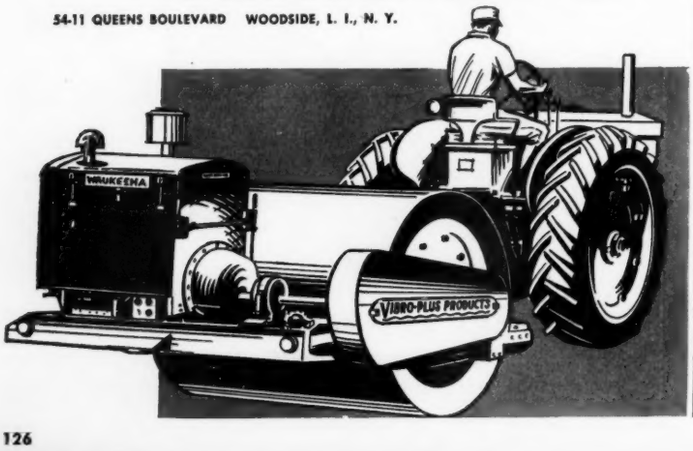
DELIVERS HIGHER COMPACTION IN FEWER PASSES

On recent construction jobs *optimum compaction* has been produced to a *depth of 2 feet* after 2 *passes* at 2 mph with the new Vibro-Plus Vibratory Roller. Strata substantially deeper than 2 feet have also been compacted with excellent results after 2 to 6 passes.

The Vibro-Plus Vibratory Roller is a self-contained unit of three tons, delivering a seven-ton centrifugal impact which compacts statically and dynamically in all directions. The unit is easily towed by rubber-tired tractors, is vibration and trouble-free, extremely economical and low in initial cost. Reports of special field tests and folder will be sent upon request.

VIBRO-PLUS PRODUCTS, INC.

54-11 QUEENS BOULEVARD WOODSIDE, L. I., N. Y.



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The new, improved, fully-hydraulic TEALE Loader-Dozer now offers 6 additional inches of valuable bucket clearance. But that's not all! Bushing area at control-arm hinge points has been increased 50%. Bucket control arms are 25% stronger. And the effect of these changes has been **increased** by a 20% reduction in the strain and wear of leverage at the bucket mounting pins, bushings and control arms. Add these improvements to the known durability of the TEALE . . . to the fine hydraulic system (including hydreco heavy-duty detent valves with float position) . . . and you'll see why a TEALE will take **anything** a crawler can give it. You'll see how extra protection against down time is built into a TEALE . . . **why** a TEALE can do the same jobs as loaders costing twice as much!

For CLEATED or SMOOTH SHOE . . . LONG or SHORT TRACK CRAWLERS

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Fits:
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Also made for Oliver B ..... $1925 READY TO MOUNT

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Teale

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teeth only produces coarser pieces, requires less pulling power, or enables the rooter to be pulled at a greater depth with the same power. A center strip may be left unbroken.

A single tooth breaks a narrow strip coarsely and takes minimum power. It is ordinarily used for very resistant material. If full breakage to depth is required, it may be necessary to run successive cuts so close together that the tractor will walk on the previous cut each time. If the soil is wet or plastic, this may compact it so that much of the advantage of ripping is lost.

Overturning is most likely when working with a single center tooth, and least probable with the two side teeth. Jamming occurs most often when three teeth are used.

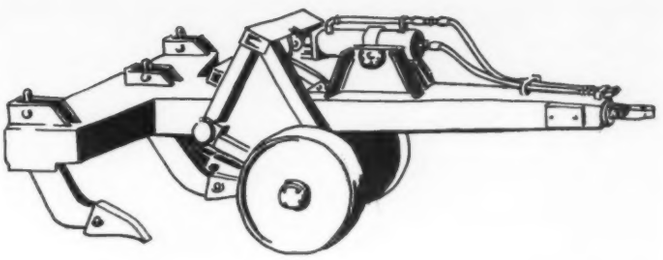
Except when breaking hard surfaces (pavement and frost) over soft material, teeth should be near full depth. Shallow ripping is irregular and wears points excessively.

Turning while the teeth are in the ground is apt to break the shanks.

Mechanical Lift

Towed rippers can also be equipped with a mechanical or ground wheel lift, similar to that used on agricultural plows. Such machines are called panbreakers, subsoil plows, or subsoilers.

These are especially useful to the excavating contractor in breaking hard soils on jobs too small to justify bringing in a heavy-duty rooter, for shallow ditching, and for subdrainage. Their cost is comparatively low, and since they do not rely on cable or hydraulic controls, they can be towed by any machine with sufficient pull. However, they are not efficient in pavements or frost heavy enough to require upward breakage, as the lift does not operate except when the wheels are turning, and too much vertical resistance will cause them to skid.



Pumping

Dewatering of excavations commonly requires the use of pumps.

If the water is small in volume or contains a heavy load of mud or other solids, a diaphragm pump is preferred. For larger quantities of water a centrifugal pump is needed. Both light hand-carry and heavier wheel models of centrifugals are available.

The pump should be supported on a platform or on boards. Otherwise, vibration and softening or washing of the ground may cause it to settle off level, or even fall into the pit.

A strainer should always be used when there is a possibility of sucking up stones or other objects which might damage or clog the line, and it is a good practice to use one whenever possible.

The inlet should be well below the surface of the water—about six times the inside diameter of the hole when possible. This is frequently not practical, particularly when the place must be pumped dry.

At lesser depths, a whirlpool may form over the inlet, and air may enter through its center in sufficient quantity to form an air lock and cause the pump to lose its prime. This whirlpool will not form if the end of the hose is vertical, and is most likely to occur if it is horizontal.

If the outlet hose is not long enough to reach a disposal point, a level or downhill extension may be made by means of a wood flume, a ditch, or parallel dikes.

If the discharge hose end is under water, the pump is stopped, and the inlet and foot valves leak or are lacking, then water will siphon from the higher level through the pump and out the inlet. On a high lift, the force may be sufficient to turn the pump and engine backward. Otherwise, the flow is leakage past the vanes.

Winches

The most powerful, most convenient, and best controlled line pull for uprooting stumps and trees, rescuing bogged machinery, and moving and setting heavy objects is obtained from winches. In excavation and clearing work these are usually mounted on crawler tractors, but may be on wheel tractors or trucks, or be portable units operated by a hand crank.

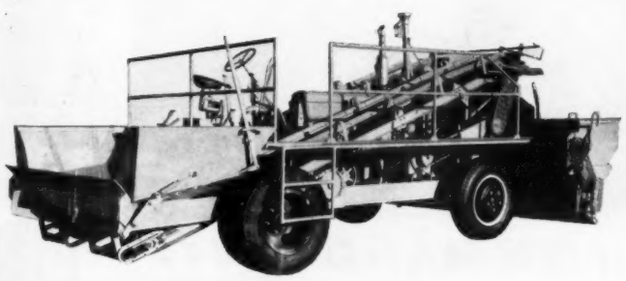
A logging winch consists of a heavy spool drum that is mounted on the back of a crawler tractor and is driven by the power takeoff. It is controlled by the tractor engine clutch and the takeoff engagement lever. In addition, it may have a transmission giving rotation of the drum in either direction and, in large machines, permitting several speeds of rotation. A

(*Continued on next page*)

OVERWHELMING APPROVAL OF THE INDUSTRY!

. . . the revolutionary

"SPREAD-MASTER" Power Spreader



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Spread cover coat material the modern way . . . it's easier, faster, more economical and superior in results! Two-man crew can make spreading continuous operation—no drag or brooms needed . . . just one straight line of uniform application. Tighter, more uniform mat is achieved by placing larger chips in asphalt first, fines on top. When rolled, choice chips then are keyed and wedged in place. Also ideal in road sanding for ice-control and sand-sealing.

New improved SPREAD-MASTER has 57 hp unit, heavyduty power steering assembly, double-acting mixing auger, trouble-free material shut-off gate in front hopper and streamlined, sturdier construction.

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Below: Model C with cable lift.

Illustrated above, 1 cu. yd. Model LD-5—4-wheel planetary drive—4-wheel power steering—Pow-R-Flex twist-turn workability—114 h.p.—8 equal speeds forward and reverse. Also available, other 4-wheel drive models in a wide range of work capacities and a complete line of 3-wheel models. Write for literature.

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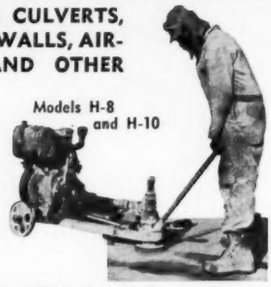
Models H-8 and H-10



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MODEL A. Lightweight, electric powered unit . . . suspends from operator's shoulder. Interchangeable heads and attachments for surfacing concrete buildings, bridges, dams, walls, culverts, etc. *MODELS H-8 and H-10.* One-man gasoline engine powered units for surfacing concrete highways, streets, floors, airport runways. Includes exclusive power take-off for attaching "BERG" flexible shaft equipment for surfacing bridges, walls, etc. Write today for descriptive literature on machines and attachments.

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Here's the handiest machine you ever owned —a fast, low priced, mobile tractor-mounted trencher for utility lines, foundations, sewer systems, septic tanks, etc. You'll find this ladder-type trencher working all the time. Cuts 6" to 20" wide trench down to a depth of 7'. Average digging speed 350' to 400' per hour — digs up to 800' per hour. Cuts through all soils the year 'round. Special chisel type cutters for rocky or frozen ground. Independent control of each drive wheel assures exact and easy regulation for either straight or curved trenches. Mounts on Ford or Ferguson tractor — easily driven from job to job — one man operated. Bulldozer blade available for backfilling. Write for all the facts today.

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(Continued from preceding page)

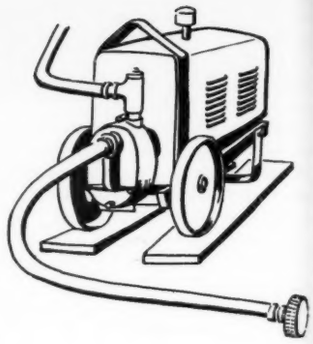
jaw clutch or neutral gear is used to disconnect the drum from the drive shaft to allow it to turn freely when the cable is being removed. A brake is provided to slow or lock the drum when necessary.

The drum carries many layers of cable (wire rope), so that it has a greater spool diameter when full than when empty. It therefore reels in more slowly and powerfully on a bare drum than on a full one. On a bare drum, logging winches will give 50 to 100 per cent more pull than the tractor.

A winch can be mounted on either end of a wheel tractor. It is usually necessary to anchor the machine for heavy pulls. The anchor chain or cable should be attached to the winch frame, or to a heavy member as near to it as possible, to reduce strain on the tractor.

Truck winches may be of the spool drum type, and may be mounted in the front bumper, on a flat-bed body, or between the body and the cab. Gypsy spool winches or catheads are generally mounted vertically on the forward part of a flat body.

The principal handicap of a truck winch is the difficulty of maneuvering it into position for a straight pull. One or more pulleys may be required to obtain a proper direction of pull and a straight line onto the winch. The truck should have all the wheels blocked, or be anchored by a line from a frame member near the winch.



Cable (Wire Rope)

A winch, whether power or hand operated, may hold 100, 200, or more feet of cable of a size proportionate to its power. Additional cable can be carried on a separate spool and connected to the winch by a choker device.

A cable should never be bent sharply, pressed against a sharp edge, or dragged or chafed on rough surfaces.

Cable or chain breakage is a serious danger to both operator and helpers. A cable particularly stretches under strain and, if it breaks suddenly, may whip with great force. The danger to the operator is greatest if the break

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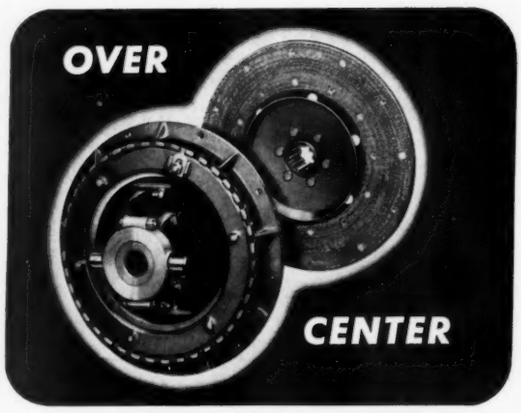

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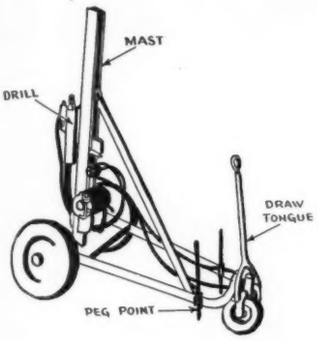
CLUTCHES

is fairly near him. The cable used should be of the best quality and in the largest size recommended by the winch manufacturer if the tractor is to be anchored for heavy pulls, and it should be inspected frequently for weak spots. If breakage is frequent, a guard screen should be placed behind the tractor seat.

Another danger inherent in the use of cable is cutting and tearing of the hands and clothing on broken wires. Preformed cable gives minimum trouble of this kind and should be used when possible. Leather-palmed gloves are good protection for the hands.

Broken cables can be repaired by splicing, but the length of cable used



in the splice and the labor involved may be too great to justify this method for the short cables ordinarily used in clearing land and moving machinery.

A rough repair may be made on cable up to ½ to ⅝ inches by trimming back the broken ends, overlapping them, and fastening them with two or three cable clamps. Three or more cable clamps should be used on larger sizes. Two interlocked loops may be made with clamps or any type of loop fastening

Cables patched in this manner are weakened, but may last a long time. The patch will not go through pulleys and is inconvenient in other ways.

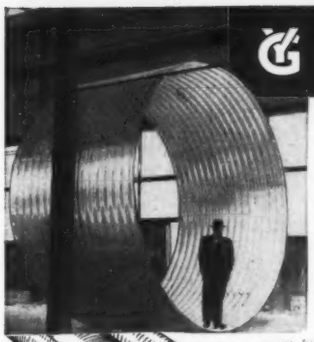
Chain

A separate chain is often used on the load to save the winch line damage from short bends and kinking. A standard logging chain is composed of short straight links, and carries a round hook on one end and a grabhook on the other. The round hook may be fastened to the chain by a ring, or a ring may be used instead of this hook.

A broken chain is best repaired by having new links forged into it by a blacksmith. However, good field repairs may be made with a variety of patent repair links, or by shackles and removable pins. Links that have been stretched thin may not admit the proper size repair piece. These may have to be spread with a punch and hammer while being supported on a block with a hole in it.

A broken chain may be used temporarily by making a square knot, and tying the end links together with wire or string. If there is not enough chain, a half knot should be used and the ends fastened with a bolt. A bolt may be used without any knot, but will pull apart more easily than a link.

THE END



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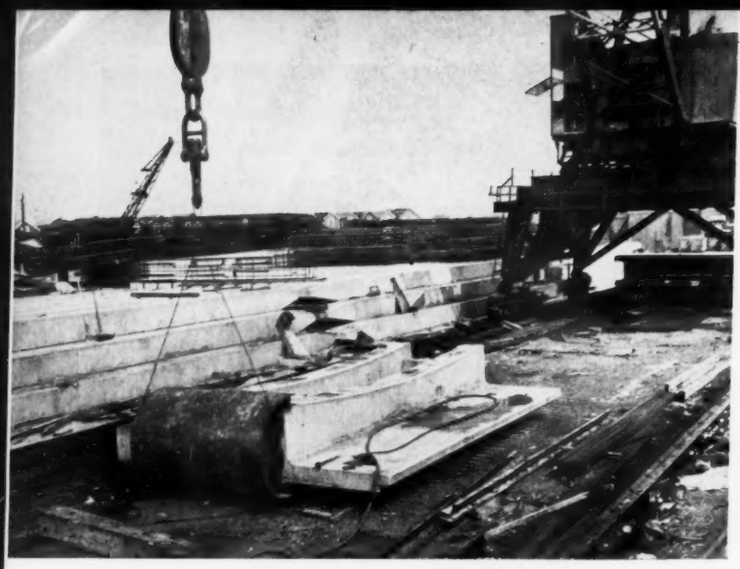


When it is lifted from the casting bed, a finished slab is set on blocks in front of the gantry crane and fitted with a reinforced half-section of a 4-foot-diameter tank.

C&E Staff Photos

One end of the slab section, having wire rope attached to the righting lugs embedded in the slab, is lifted by the gantry. The half-tank at the other end acts as a rocker while the slab is righted.

Upside-down precasti

Half-slab sections of bridge deck are cast on their backs, cured, turned over, and then erected between pile bents

To simplify formwork and permit early stripping, half-slab sections of deck for the new rapid-transit trestle near Rockaway, New York, were precast upside down. Right-side up, the deck sections are double T-beams 21 feet long and 14 feet wide.

By casting the sections upside down on a concrete bed, Merritt-Chapman & Scott Corp., New York, N. Y. eliminated all forms except those at the sides of the slab and the beams. And because the upside-down position left no unsupported areas, the form could be stripped the next day and used again.

The precast slabs will form the deck of the new Jamaica Bay trestle that will once again carry trains directly to Rockaway Beach. The old timber trestle burned down about four years ago, and ever since, trains bound for Rockaway have had to travel at least an extra half hour.

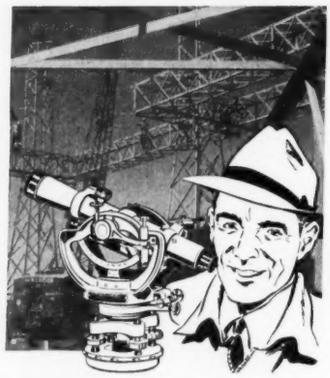
The New York City Transit Authority awarded the $6 million contract late in 1953. Plans call for a total of 6,640 feet of trestle covering three bodies of water. Two channels are bridged by steel-truss swing spans with 100 feet of clearance on each side. Both bridges have seven steel-beam approach spans on each side, supported on piers spaced 80 feet on center. The rest of the structure consists of a low-level trestle composed of precast slabs supported on concrete pile bents. The 6-pile bents are about 21 feet apart.

Merritt-Chapman & Scott started the job last year. One crew was organized to begin work on the piers for the swing spans and the other set up a yard at Rockway to do the precasting.

Precasting

M-C&S precast the 900 concrete

Precision-built for the man behind the gun...



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Other advantages of this outstanding instrument include coated optics, internal focusing and a ball-bearing race for smooth operation even in sub-zero weather. Check out a White on your next trip and discover how much easier your work can be. Write for DAVID WHITE Bulletin 1053 and name of nearest dealer, 335 Fourth Ave., Milwaukee 12, Wis.

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Hydraulic raising and lowering...lessens blade abuse and reduces operator fatigue.

Exclusive pointer weight transfer... machine "floats" over rough obstacles in concrete—minimizes binding.

Unit is equipped with Vickers Torque-Converter Power Pack for propelling machine . . . insures long trouble-free life.

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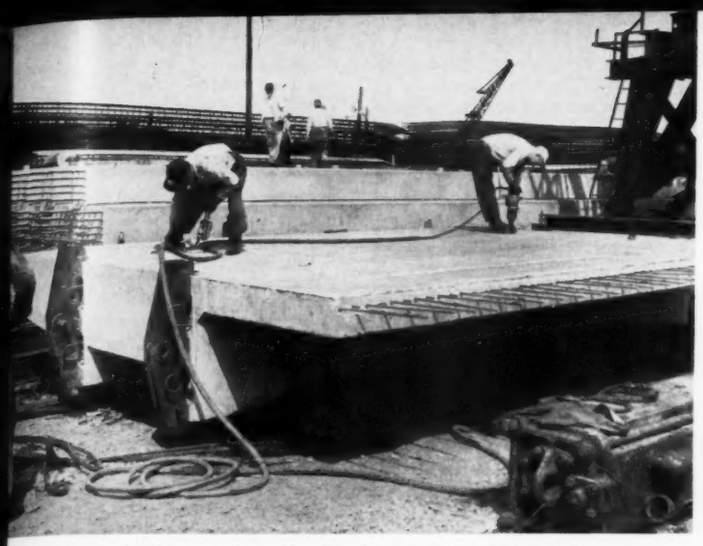

The Richmond 1½-inch anchor bolts which have been cast in the slab are removed after the slab is turned over. In the photo at right, the precast unit is lifted from the blocks and stockpiled by the gantry crane.

mplifies formwork

piles and the 362 deck slabs on two parallel casting beds. A revolving gantry crane ran between the beds handling forms, placing concrete, and stockpiling precast units.

The contractor organized the precasting work to be carried on continually for about five months. The schedule called for casting about ten piles and three slabs every day. Beds were large enough to provide space for pouring new units and allowing others to cure for 14 days.

The slabs were poured in a contractor-developed steel form that was easy to assemble and strip. It was made in five pieces: two plates to form the ends, one large welded unit to form the sides of the beams, and two small locking strips.

Before the form was assembled, the area of the casting bed to be covered by the 21×14 slab was sprayed three times with Dura Cure. This paraffin-base curing compound reduced practically all bond between the two concrete surfaces and made it simple to strip the unit even after 14 days.

After the compound had been applied, four Richmond 1½-inch an-

(*Continued on next page*)

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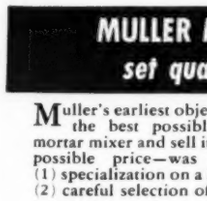
set quality standards in their fields

Muller's earliest objective—to make the best possible plaster and mortar mixer and sell it for the lowest possible price—was achieved by: (1) specialization on a few models . . . (2) careful selection of materials and components . . . (3) experienced workmanship . . . (4) sound distribution methods. Other Muller Machines, also, rank high in their fields for the same reasons.



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Made in 2, 3½, 6, 6 to 8, and 9 cu. ft. sizes. Electric motor or gas engine power. All models have Muller Lifetime Paddle Shaft Seal to protect bearings. Power throwouts on smaller models, built-in disc clutch on larger. Many other features. Priced $180 to $700 FOB Factory. Rubber scraper blades are available for all sizes.

CONCRETE MIXERS

3 models, 3 to 6 cu. ft. capacities, tilting type. Ample size drums, fast mixing action, Timken Bearings, electrically welded, sturdy construction throughout. Power—electric motor or Briggs & Stratton Air Cooled Engines. Prices $230 to $660, FOB Factory.

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2 sizes—29" diameter, 1¾ HP; and 34", 2¼ HP Briggs & Stratton Engines. Stationary guide ring eliminates hand troweling when finishing along baseboard. Engine speed regulated by governor control on handle.

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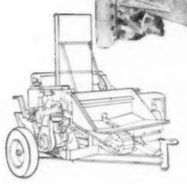
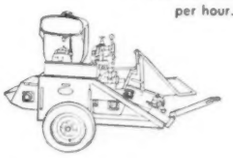
***McConnaughay* HTD—JR ASPHALT MIXER** **NEW!**



HTD-LP . . . up to 10 tons *hot* mix, 30 tons *cold* mix per hour.

HTD-500 . . . up to 7 tons *hot* mix, 15 tons *cold* mix per hour

HTD-B . . . up to 5 tons *hot* mix, 10 tons *cold* mix per hour.



JR . . . up to 60 tons *cold* mix per hour.

UP TO 60 TONS COLD MIX or 20 TONS HOT MIX PER HOUR

for resurfacing and patching

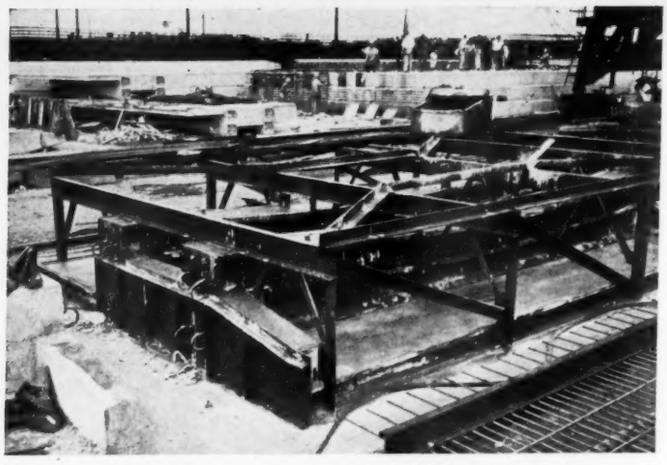
Especially recommended for continuous operation in the production of cold bituminous mixtures, the new *McConnaughay* HTD-JR will handle up to 60 tons per hour on location . . . assuring exceptionally fast, low-cost resurfacing.

With a 24-inch metal conveyor for proportioning the aggregate and a 55-gallon-per-minute positive displacement pump for proportioning the bituminous material, this *McConnaughay* HTD-JR can produce *one ton per minute* on the job! Thanks to a trailer-type hitch with a lever-operated mechanical jack leveling device, the unit may be coupled to aggregate trucks for mixing and depositing on the move.

In addition, the new *McConnaughay* HTD-JR is designed and equipped to produce up to 20 tons of hot mix per hour for pavement resurfacing and patching. The value of such versatility is evident; your assurance of fast, economical asphalt mixtures for practically any job, on any location, at any time of the year. Write, wire or 'phone for details and specifications today.

K. E. McCONNAUGHAY

LAFAYETTE, INDIANA



After being cast, concrete cures in one of the half-slab forms. The form is of quarter-inch plate, braced with angles and hung from channels.

C&E Staff Photo

(Continued from preceding page)

chor bolts were placed upside down on the bed. These were imbedded in the beams and used later to turn the slab over. To keep the heads extended beyond the slab's surface, the bolts were set into 2-inch-deep holes in the bed.

Reinforcing steel, mostly prefabricated, was then brought in and placed above the bed on briquettes. On one side of the slab the transverse bars were extended through the metal side form to act as dowels for a conduit box which was added later. A small wood form was used on the other side.

Steel Form

With the reinforcing and the two side forms in place, the large steel form for the beam sides was lowered onto the bed. Quarter-inch plate, braced with angles and hung from channels, formed the sides of the haunched beams. The ends were closed in with steel plates fitted with wood pieces for forming the hairpin pockets. Four 1½-inch anchor bolts were also placed in the top of the beams to provide a thread for screwing the lifting frame to the unit after the 14-day cure. Other bolts were set in the ends for anchoring the lugs and rocker required later to turn the slab over.

When the form was completely bolted together, ready-mix concrete was placed inside and vibrated. The 45-ton gantry crane placed concrete with a 2-yard Insley bucket.

On the following day, the form was stripped by first removing the bolts that held the end plates to the frame of the main form. Then the bolts holding the side forms to the braces were removed, allowing the plates to move just far enough away from the concrete to permit the entire frame to be lifted from the slab section.

Dura Cure was applied all over the stripped slab to enable it to retain the proper moisture content.

Turning the Slab

After the slab had cured for 14 days, it was ready to be turned right-side up. The four bolts in the top of the beams were removed, a lifting frame was set on top, and the bolts were screwed back in with Chicago Pneumatic impact wrenches.

The 28-ton precast units were then lifted from the bed and set on wood blocks between the gantry rails. On one end, a semicircular reinforced section of a 4-foot-diameter tank was bolted to the beams to act as a rocker. Righting lugs were bolted to the other end. Turning, therefore, was a simple matter of lifting one end with the crane as the other rolled on the rocker. At the end of the swing, the slab was set right-side up on two blocks. The rocker and lug were removed, the 1½-inch anchor bolts projecting from the slab's surface were removed, and the lifting frame screwed in as before. Units were then stockpiled, or placed directly on a barge.

Pile Precasting

Piles were cast on the paraffin-coated bed in about six areas. They were 24 inches square and varied in length from 50 to 75 feet. Steel side forms were laid on the bed and braced across the top with angles. Turnbuckles served as bracing between the form. Ten to twelve piles were usually poured at once to cover the complete width of the bed.

Concrete was placed with an Insley 2-yard bucket handled by the gantry crane. Homelite vibrators consolidated the concrete. During the winter, Herman Nelson space heaters

HAVE YOU THOUGHT OF THIS?

HOW TO:

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- Get the capacity and flexibility to handle a wider range of contracts

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THE ANSWER TO EVERY PRIMARY CRUSHING PROBLEM

Whatever your pit or quarry conditions... too much oversize, abrasive gravel or rock, wet or sticky material . . . there's a size or type of Cedarapids Portable Primary to help you get more profit out of your crushing operations. The plant shown above is a standard Jaw Crusher unit with a vibrating grizzly and can be used ahead of a gravel or rock plant.

VIBRATING GRIZZLY is especially effective where there is a high percentage of fines, or wet, sticky material. By-passing fines prevents choking of the jaw crusher, reduces wear on the jaws, and increases production of the primary unit up to 25%.

TWIN JAW CRUSHER increases production up to 40% over single jaw primary units. It gives excellent results in conditions where the rock or gravel is highly abrasive.

DOUBLE IMPELLER IMPACT BREAKER assures exceptionally high production of cubical shaped aggregate. Like all types of Cedarapids primary units, it can profitably be used in either portable or stationary applications.

ADD A CEDARAPIDS PORTABLE PRIMARY to your present equipment

● Here's the way to get the jump on competition! Simply add a Cedarapids Portable Primary Crusher to your crushing plant for a set-up *that can't be out-produced* in any pit or quarry, as far as profitable operation is concerned.

With a Cedarapids Portable Primary handling the heavy crushing load, you can turn 100% of pit run material into specification product . . . re-open old gravel pits considered unworkable due to large boulders or high percentages of oversize. You can produce crushed rock from quarries near the job, if local gravel deposits are exhausted, and reduce hauling costs.

In *any* condition, with a Portable Primary you can crush oversize impossible to crush before and obtain more balanced production and greatly increased output.

Ask your Cedarapids distributor to recommend the size and type of Portable Primary that will turn your most difficult jobs into a high-profit operation.

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maintained the proper curing temperature. Stripping was done the next day simply by loosening the turnbuckles and lifting the form. Four days after the pour, the piles had set long enough to permit them to be used as side forms for an alternate group. This system was used on all six beds to place piles three tiers high.

An unusual feature of the pile precasting was the prefabrication of the reinforcing cages. The Raynor Corp., Long Island City, a subcontractor to M-C&S, assembled the bars quickly and efficiently on special horses made of 6-inch channels.

A typical reinforcing cage consisted of 16 bars assembled in a square cross-section with 5 bars to a side. Three types of stirrups were used: one completely around the outside of all the bars; one around all but the top level; and one around the top middle three and the bottom middle three bars.

Raynor's setup permitted fabrication of about six cages at once. His yard consisted of a group of parallel assembly frames made of steel horses about 8 feet apart and 4 feet high. The long bars were stockpiled next to the horses and the stirrups.

The longitudinal bars were first placed on the horses in three levels. Each level of bars was supported by a steel pin that could be removed easily. The prefabricated outside stirrups were then placed around the bars and hung from the top level.

When the required number of stirrups had been tied in place at the top, the bottom pin was pulled and the five bars dropped onto the lower bend of the stirrup. This procedure was repeated with the other stirrups until the complete cage had been wired. With this process, each cage was assembled in less than an hour.

River Work

Most of the river work followed conventional methods. M-C&S used a fleet of floating rigs consisting of one 35-ton whirley, two 50-ton whirleys, three A-frame derricks, and a Bay City and a Link-Belt crawler on barges.

The precast piles were hauled out on a barge and jetted as far as possible, using a steel template as a guide. The 30-foot penetration and 65-ton bearing were achieved by driving with a McKiernan-Terry S10 hammer.

Timber piles for supporting the piers were driven with a McKiernan-Terry S5 hammer. Required penetration was 30 feet and load, 30 tons.

Cofferdams for the small piers were constructed by first placing prefabricated steel frames on the bay bottoms and pinning them temporarily with H-piles. Steel rings were then set on top, and sheet piles were driven around the frames. With the ring bolted to the sheets, the frame could be pulled out and used on another cofferdam. This method eliminated the necessity of driving temporary piles at each cofferdam to support the rings.

Most of the pier concrete was made in a floating plant with a capacity of 60 yards per hour. One A-frame derrick helped with the placing and another charged the aggregate bins.

One of the new features of the concrete setup was the use of special bulk cement containers made by the LCL Corp., New York, N. Y. M-C&S used about 66 of the 50-barrel steel containers for supplying cement to the plant.

Cement was moved from the containers in an air stream activated by a 600-cfm compressor. Forced into the

(Concluded on next page)

Concrete is placed for alternate piles in a second tier by a 2-yard Insley bucket handled by the gantry.

C&E Staff Photo

Lorain knows from long experience just how to build a real dirt-moving, profit-making dragline. In every model, you get features in a Lorain that insure fast, low-cost, long-life dragline performance.

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CONTRACTORS AND ENGINEERS

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(*Continued from preceding page*)
containers through a 1½-inch opening, the air stirred up the cement into a fluff that was carried out through a 4-inch connection to a flexible hose and then to a rubber hose. About 20 minutes was required to empty a container.

Advantages of the sealed container system were simplicity of the method, all-weather operation, and enclosed loading.

Personnel

M-C&S's key personnel on the job are Rod Hand, project manager; George Mears, project engineer; M. Stinchcomb, yard superintendent; and John Tooker, marine superintendent. V. Lefkowitz is resident engineer for the New York City Transit Authority. THE END

U. S. Firms Cooperate In Replacing Equipment

A contractor's losses from downtime due to severely damaged equipment on a Philippine Islands dam project were minimized when two U. S. manufacturers cooperated to replace the damaged machinery.

The machine, a big Bucyrus-Erie power shovel, was knocked out of commission when a huge rock rolled from the top of a cut and smashed into the cab. The motor-generator set was rendered useless by the accident, and because no replacement equipment was available in the islands, the contractor faced a long period of idleness and losses amounting to several thousand dollars.

Two manufacturers in the states took the matter in hand, however, and worked around the clock to replace the damaged machinery. General Electric's apparatus sales force in Milwaukee, Wis., cooperating with the Bucyrus-Erie Co., South Milwaukee, arranged to have a motor-generator set diverted from one of the builder's orders and sent to the Philippines. At Fort Wayne, Ind., General Electric's direct current and generator department worked speedily to prepare the unit and ship it to San Fransisco.

From the coast, the unit was shipped by freighter to the Philippines, and within a month of the accident, the shovel was back in use.

Catalog of Dump Bodies And Hydraulic Hoists

■ Its Model 12N-4 bodies and Model 740, 770, and 800 hydraulic hoists are described in a catalog from Galion Allsteel Body Co., Galion, Ohio. These dump bodies are offered in lengths of 9 and 10 feet. Matching hoists are rated from 11 to 14 tons capacity.

Action photos, cutaway views, and line drawings illustrate construction features, mechanical details, and design advantages of the equipment. Complete specifications covering this series of bodies and hydraulic hoists are included.

To obtain Catalog L-9828 write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Electric Melting Pot For Asphalt and Tar

■ Its new portable electric melting pot is described in a bulletin from Glas-Col Apparatus Co., 711 Hulman St., Terre Haute, Ind. The bulletin lists applications of the unit, such as melting asphalts, tars, pitches, resins, mastics, and various viscous materials.

The melter, which has a 3½-gallon capacity, weighs only 15 pounds and has over-all dimensions of 12 x 13 inches.

To obtain this literature write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

Catalog of Rock Bits

■ A new bulletin employs two charts to illustrate every tungsten-carbide Rok-Bit manufactured by Brunner & Lay, Inc., 9300 King St., Franklin Park, Ill. The line includes shoulder-union bit types and bottom-drive bits.

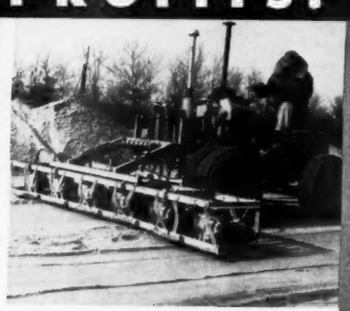
Detailed recommendations made for the use of every bit consider thread type, size of drill steel, machine normally used, and range of sizes with specific thread. The charts are intended to help the contractor select the right bit for the job.

To obtain Bulletin B-1 write to the company, or return the Request Card at page 18. Write the manufacturer's name on the card.

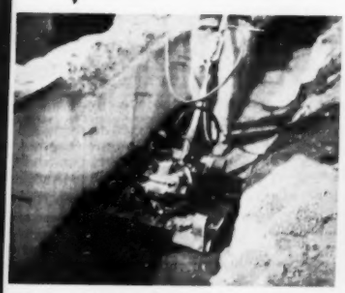
10 LEADS TO BETTER, FASTER RESULTS and BIGGER PROFITS!

MACADAM DENSIFICATION. Usually just one pass of the Jackson Multiple Compactor is required to key 12" of rock to final density — one pass to completely fill voids with fines.

PAVEMENT WIDENING. The Multiple Compactor can be quickly converted to provide in ONE PASS 100% of required density in granular soil sub-bases and rock courses in any widening project.

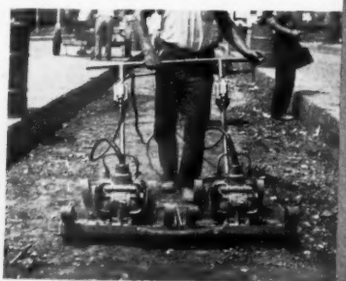


GRANULAR SOIL FILLS. The Multiple Compactor quickly achieves specified density, gets into places bigger, more expensive equipment cannot reach. Individual units can be detached, operated as manually guided compactors.

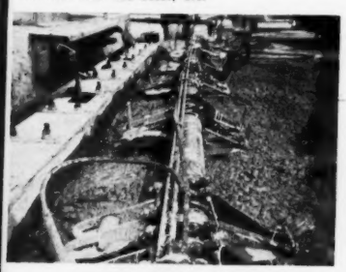


SOIL COMPACTION. Self-propelling, the JACKSON COMPACTOR, with 12" to 24" interchangeable bases, achieves specified density of granular soils in 8" to 10" depths at 2000 sq. ft. per hr. Perfect for bridge and pipe line fills, concrete floor sub-bases, etc.

BLACKTOP WIDENING & PATCHING. The same machine operated from power plant on auto-trailer with pickup for Compactor is most efficient means of blacktop pavement patching, paving walks, drives, etc. Will compact up to 2000 sq. ft. per hr. close to maximum density.



TWIN-UNITS — ONE OPERATOR. With a two-unit, side-by-side or tandem hookup of JACKSON COMPACTORS, one man can readily do the work of two, since the compactors are self-propelling and he has only to guide them.



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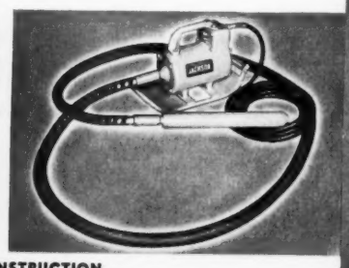

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See page 155

AVOID LEGAL PITFALLS

Edited by A. L. H. STREET
Attorney-at-Law

These brief extracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Usurious Contract

THE PROBLEM: *Plaintiffs agreed to "lend" $5,000 to defendant construction company to assist it in a building program, and the company agreed to pay plaintiffs $10,000 at the end of one year. A note was given for the latter amount. Did the fact that the agreement contemplated that the $5,000 would be used on construction projects with a view to sale of the buildings at a profit to the company render the arrangement one of joint venture—akin to partnership—or was the transaction invalid as involving a usurious loan?*

THE ANSWER: There was an invalid agreement for a usurious loan, and the plaintiffs were not entitled to enforce payment of a balance due on the note. (Martin v. Ajax Construction Co., 269 Pac. 2d 132, decided by the California District Court of Appeals, Second District.)

The decision does not mean that one who advances money to carry on a construction business as a joint venture or partnership cannot derive a profit that exceeds a legal rate of interest on a loan. But it does mean, in California, that where the lender is entitled to be paid more than legal interest for the use of the money, without regard to whether the venture prospers or not and without any voice in the enterprise, the transaction must be regarded as a usurious loan.

The decision in this case does not necessarily reflect the law in other states, although it is probably in line with what the courts in most states would decide. But much depends upon the wording of the usury statutes in a particular state. For example, in Minnesota a statute provides, in effect, that there is no usury in a contract whereby one advances money to be used in a business or venture under agreement that the party receiving the same shall refund the same, with lawful interest plus a share of the profits of the business or venture.

Road Warning Signs

THE PROBLEM: *A bridge contract specified what warning signs must be erected by the contractor along the approach to the bridge during construction. A motorist's car overturned on the approach. Could the contractor's liability be based upon failure to comply with the requirement calling for signs that would not have been necessary if ordinary care had been exercised?*

THE ANSWER: No. (State Construction Co. v. Johnson, 77 S.E. 2d 240, decided by the Georgia Court of Appeals.)

The court reasoned: A contract between a contractor and the state or other public body cannot alter the obligation of the contractor to public safety. Had the contract not provided for sufficient warning signs, the contractor would still be held responsible for maintaining adequate signs. By the same token, the contractor was not bound to provide more signs than were reasonably necessary.

The decision was influenced by a similar one rendered by the Ohio Supreme Court in a case involving a contract with a county board for re-

(Continued on next page, col. 3)

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(Continued from preceding page)

pair of a viaduct. (Wymer-Harris Construction Co. v. Glass, 122 Ohio St. 398, 171 N. E. 857, 69 A. L. R. 517.)

The New Jersey courts have likewise adopted the position that in an ordinary personal injury suit a public contractor's duty to members of the public is measured by a noncontractual obligation to use reasonable care for their safety. (Styles v. F. R. Long Co., 67 N. J. L. 413, 51 Atl. 710.) In that case, a bridge contractor was declared not to be liable to a pedestrian for failure to light the footbridge, as provided for by the contract.

But in a Colorado case (Lewis v. La Nier, 84 Colo. 376, 270 Pac. 656), the Colorado Supreme Court left undecided the question of whether an injured person, instead of bringing a suit based upon negligence, could maintain a suit on the ground that the provision for barricades in a road-construction contract was intended to benefit members of the public and that, as such beneficiaries, they could maintain a suit for damages for breach of contract as distinguished from a suit for negligence.

The Colorado court was evidently aware that there are some appellate court decisions to the effect that contract provisions of the general nature here under consideration are enforceable at the instance of injured members of the public.

Workmen's Compensation—Interstate Employment

THE PROBLEM: *The general contractor, a subcontractor, and the latter's employee were all New Yorkers involved in a construction project in Pennsylvania. The employee's work on the job was done partly at the subcontractor's office in New York and partly at the job site in Pennsylvania. He was injured in Pennsylvania while driving back to the job site from the office. The subcontractor did not carry workmen's compensation insurance covering the employee. (1) Did the New York Workmen's Compensation Board have jurisdiction of the injured man's claim for compensation? (2) Was the general contractor liable for an award covering the employee's injuries because the subcontractor was not insured?*

THE ANSWERS: (1) Yes. (2) Yes. (DeStefano v. Consolidated Tile Co., 138 N. Y. Supp. 2d 360, decided by the New York Supreme Court, Appellate Division.) Comment: The case involved an interpretation of provisions of the New York Workmen's Compensation Law not found in the compensation laws of other states.

Backing Trucks

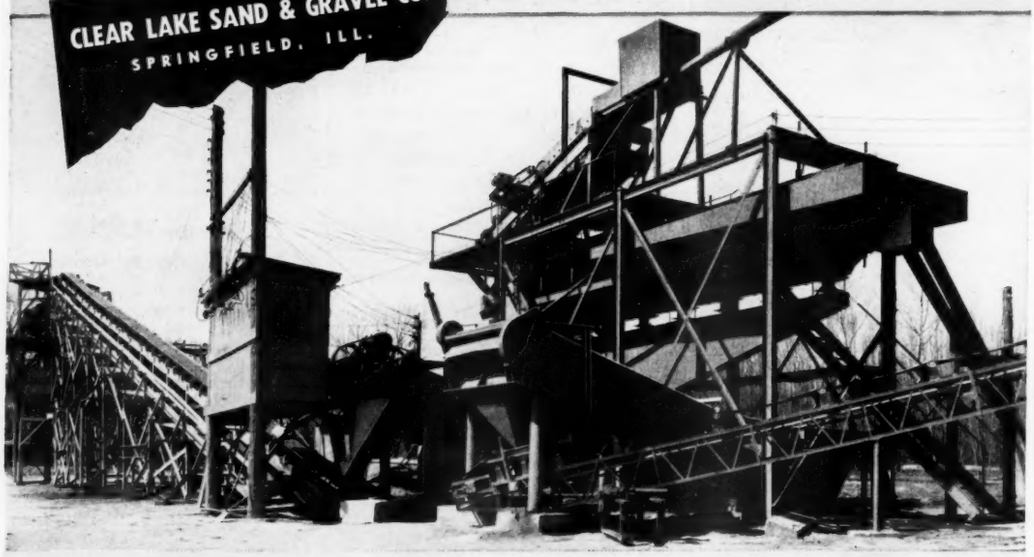
THE PROBLEM: *A paving subcontractor's engineer was injured by backing of a truck operated by a hauling subcontractor. Was the latter liable in damages for the accident?*

THE ANSWER: No. It was the fault of the paving subcontractor for not providing a flagman to direct the backing of trucks. (Olson v. Sharpe, 259 S. W. 2d 867, decided by the Tennessee Court of Appeals, Eastern Section.)

Strike Ruled Illegal

THE PROBLEM: *A painters' union struck against an employer who refused to restrict use of pan and pressure-roller painting equipment. Under Michigan law, was the employer entitled to an injunction restraining detrimental strike measures on the*

"The Fines We Save Are Paying For Our EAGLE Washing and Classifying Equipment."



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ground that the strike was unlawful and involved an attempt to illegally restrain trade?

THE ANSWER: Yes. (Austin v. Painters' District Council No. 22, 64 N. W. 2d 550, decided by the Michigan Supreme Court.)

The court said that the union did not present evidence supporting a contention that use of the equipment would be injurious to the health or detrimental to the safety of users.

Abandoned Project—Rights of Contractor

THE PROBLEM: *The government ordered suspension of work on a housing project and later cancelled the contract, which provided for payment on a cost-plus-fee basis. Was the contractor entitled to reimbursement for wages paid to maintain a labor force sufficient to enable early resumption of work, which had been contemplated?*

THE ANSWER: Yes. (Riess & Weinsier, Inc. v. United States, 117 Fed. Supp. 562, decided by the United States Court of Claims.)

But it was decided that, where time of the home office of the contractor had been equally divided between the particular project and a contract with another owner, only half of the overhead should be apportioned to the government project.

Cave-In Accident

THE PROBLEM: *Sixty-seven feet of a foundation ditch, 19 feet deep and 87 feet long, had been shored and cribbed when an employee was fatally injured by a cave-in of the unshored 20 feet. (1) Could the employer be held liable in damages on the ground that he had failed to comply with a statute which required the use of a safety device in general use in the construction industry? (2) Was the employer exonerated on a theory that he could not be held liable for injury while safety shoring was being installed?*

THE ANSWERS: (1) Yes. (2) No. (Abeyta v. Pavletich, 260 Pac. 2d 266, decided by the New Mexico Supreme Court.)

The court said: The unshored part of the ditch was specially dangerous because the soil was wet clay and the banks were vertical. It was unsound to argue that because 40 per cent of the industry in the territory used one type of shoring, 40 per cent another type, and the remaining 20 per cent used none, there was no safety device in "general use" within the meaning of the statute.

On the second question, the court said the ditch should have been shored as the excavation progressed. Merely starting to crib an already dangerous section was not a compliance with the statute.

Smokestack Fell

THE PROBLEM: *A steel company agreed to fabricate and erect a steel smokestack for an industrial company. It let erection of the stack to a contractor, who agreed to furnish and operate the crane to be used on the job and to be responsible for any damages caused by failure of the crane. While the work was being done by the contractor's crew, a section of the stack fell upon the boilerhouse and damaged it. The steel company was sued by the firm for damages, and it paid them. Was the contractor bound to reimburse the steel company?*

THE ANSWER: Yes. (Kitchin v. Gary Steel Products Corp., 83 S. E. 2d 348, decided by the Virginia Supreme Court of Appeals.)

Contractor Not Liable For Vibration Damage

THE PROBLEM: *Was a city contractor liable for damage to a building adjacent to a street in which a sewer excavation was being made, provided the work had not been carried on negligently? The damage occurred in the excavation of a ditch 24 feet deep and 8 feet wide and was caused by the vibration of heavy machinery in the driving of steel sheeting.*

THE ANSWER: No. (Daly v. Earl W. Baker & Co., 271 Pac. 2d 1114, decided by the Oklahoma Supreme Court.)

The Court cited decisions by the appellate courts of Arkansas, Texas, Washington, and Iowa to the effect that a public contractor is not ordinarily liable for damages resulting from performance of his contract without negligence.

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Hazelmere's Barber-Greene finisher lays a smooth course of blacktop on a southwestern Minnesota highway. Before this asphalt course was put down, the base was spread by motor graders and compacted by rubber-tire rollers.

Hot-mix paving crew makes minutes count

Careful planning and speedy moves enable contractor to complete six blacktop jobs in one short season

The asphalt finisher laid the last few feet of a long strip of blacktop on a section of road across the flat Minnesota countryside. Just ahead of the stake which marked the end of the run stood a low-bed trailer. As the finisher passed the marker, the operator hoisted his screed and the machine's crawler crept smoothly up the ramp onto the trailer. With hot material still in its hopper, the finisher was quickly blocked on the trailer and hauled back down the road in the direction from which it had come.

Just 14 minutes later it was back on the road—3½ miles away—placing the second strip adjacent to the one it had just completed, and without even waiting for a truckload of material.

This carefully planned operation, in which capacity is kept at an absolute peak and lost time is pared to the bone, is typical of the operations carried on in several midwestern states by the Hazelmere Bituminous Co., Fairmont, Minn.

During the 1954 season, Hazelmere kept three Barber-Greene hot-mix asphalt plants in operation: one at LaFayette, Colo., another at Winner, S. Dak., and a third on the move in southwestern Minnesota. A fourth, a Barber-Greene travel-plant, was kept on stand-by. The Minnesota plant, the newly developed 200-ton-per-hour Model 848, offers the best picture of the company's operations and is the most interesting from the mechanical standpoint.

Extreme portability is not generally associated with asphalt-mixing plant equipment in the 200-ton-per-hour range. Yet, during the 1954 season, Hazelmere moved its plant a total of five times and finished six different jobs scattered through the southwest corner of the state. Each one of the major components of the plant—mixer, dryer, and dust collector—is rubber-tire mounted and is equipped with a trailer hitch for over-the-road towing.

Pick Up New Plant

Rather than wait for delivery, the Hazelmere officials called at the Barber-Greene factory in Aurora, Ill., in July, 1954, and drove home with their complete set of plant equipment, including a new finisher. The 450-mile trip to Minnesota was made without incident at speeds in the vicinity of

PROVEN PERFORMANCE

Accepted as a standard of comparison for the industry—the Insley Hoe is rugged, fast, easy to operate.

Simplified maintenance and dependability keep this machine on-the-job . . . performing profitably.

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BEFORE AFTER

The BMCO "ROCK BUSTER" breaks and crushes oversize rock in pit run materials right on the roadway for base course in construction of modern highways. Re-conditions scarified asphalt top material. Eliminates the need for crushing and screening plant. Requires only one operator for tractor and Rock Buster. Saves labor and that extra haul.
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While an Adams motor grader spreads the plant-mix base material, a Tampo 13-wheel roller compacts the material to grade. This equipment was also used to compact the top lift of the crushed-gravel subbase.

35 mph. By July 14 the new plant was set up and in operation at Currie, Minn. From that day to the end of the season, the wheels hardly stopped turning long enough to cool off.

Here are the tonnage totals for a season that lasted less than four months and which was one of the wettest in history:

Project	Tonnage Produced	Hours of Operation
State Route 47	17,000	86.5
State Route 47	20,000	101.25
12 mi. County Rds.	13,000	50.25
State Route 91	18,000	96.5
6 mi. County Rds.*	6,200	32.75
State Route 4	31,000	162.25
State Route 47	6,115	25.75
Totals	111,315	555.75

** Done in two sections of three miles each, necessitating movement of road equipment.*

This is a total tonnage for the season of 111,315 in a total of 555.75 hours of operation, or an average of 200 tons per hour.

Probably as noteworthy as the plant production figures is the very small amount of time consumed in moving the plant from one job site to another. Take the case of the move from Currie to Storden, a trip of about 19 miles. Just 1½ days after shutting down at Currie, the plant was in operation at Storden.

A Typical Job

For a picture of this contractor's way of operating, once on the job, consider the work done on State Route 4 out of Sleepy Eye. In addition to a considerable amount of bituminous resurfacing done in the city on the street approach to the highway, this contract included the complete rebuilding of a 13.1-mile section reaching nearly to the village of Godahl. This rebuilding, to replace an existing surface-treated section of road, began from the ground up with a 3-inch subbase of minus one-inch screened gravel taken from a pit immediately adjacent to the right-of-way.

After completion of the grading, which was subcontracted to the firm of J. K. Hodgman Construction Co., Granada, Minn., the 3-inch screened-gravel base was placed and compacted with rubber-tire rollers. On this subbase, 5 inches of crushed gravel passing the ¾-inch screen was spread and rubber-tire compacted.

The specifications for this job called for two bituminous lifts: a one-inch leveling course of an MC-2 mix and a 2-inch wearing course of an asphalt-cement mix. Materials for both courses were mixed in the same plant.

In order to eliminate long periods of downtime on any of the road equipment, Hazelmere decided to switch back and forth from the MC to the AC mixes. As it worked out, the plant generally ran MC one day and AC the next. On any day when wearing course was being placed, graders and rubber-tire rollers were also at work aerating, spreading, and compacting the leveling course which had been mixed and dumped in windrows the preceding day. In effect, this permitted work to proceed on the leveling and wearing course simultaneously. Actually, some base placement was going on at the same

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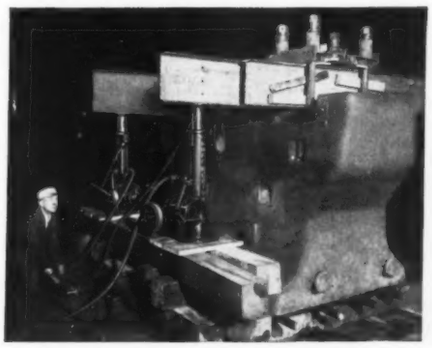

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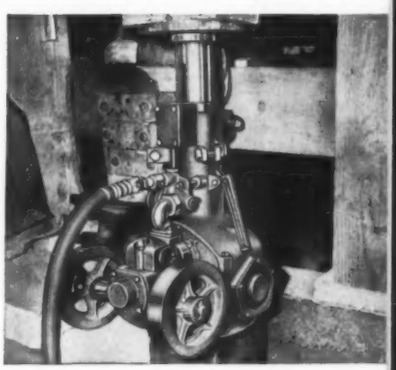

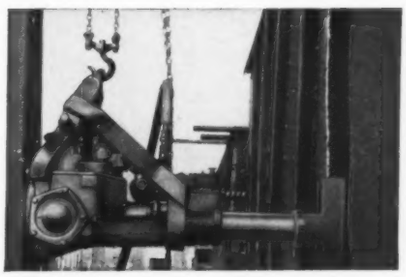

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time, too.

Since the aggregate specifications for both the MC and AC mixer were the same, the only plant change necessary was a switch from one asphalt pump sprocket to another, plus a simple valve switch from the MC to the AC tank or vice versa. The speed change in the asphalt pump was necessary since the specifications called for 5.3 per cent AC and only 3.7 per cent MC. The change in pump sprockets, incidentally, was accomplished regularly in 15 minutes and since it was done before beginning operations, no plant shutdown at all was involved.

Aggregate Production

The aggregate supply, which was located at the plant site, consisted of pit-run gravel crushed to minus ¾ inch in a Cedarapids Commander two-stage crushing plant. This plant, containing an 11×36 primary jaw crusher and a 30-inch secondary roll crusher, was powered by an International UD-24 diesel engine. Two International tractor-dozers, a TD-24 and a TD-14, worked the gravel from the pit to the trap feeding the crusher. A 30-inch belt fed the material from the plant directly into trucks.

This Cedarapids Commander two-stage crushing plant produces aggregate for an asphalt paving job near Sleepy Eye, Minn. An International UD-24 diesel engine mounted on the army surplus truck in foreground powers the plant.

Since this aggregate was the same as that used for the 5-inch base course, trucks were loaded in turn regardless of whether the load was destined for the base or the plant stockpile. A total of 33 trucks, ranging in capacity from 5 to 15 cubic yards, hauled from the plant. As many as 16 of these were required to supply the mixing plant.

A random selection from the several aggregate sieve analyses taken by the Minnesota State Department of Highways on the Sleepy Eye job shows the following gradation:

Passing	Per Cent
¾-inch screen	100
⅝-inch screen	98.4
⅜-inch screen	88.9
No. 4 screen	70.7
No. 10 screen	58.7
No. 40 screen	17.7
No. 200 screen	3.7

Moisture in the aggregate ranged from 4 to 8 per cent, with an average of about 6 per cent. The dryer reduced this to a maximum of 1 per cent before mixing.

MC mix for the leveling course was hauled to the road and windrowed by dump trucks. Adams 610 motor graders then made four passes to aerate the mix before spreading it to 1-inch nominal thickness. Three Tampo 13-wheel rubber-tire rollers pulled by Farmall MD wheel tractors provided the compaction.

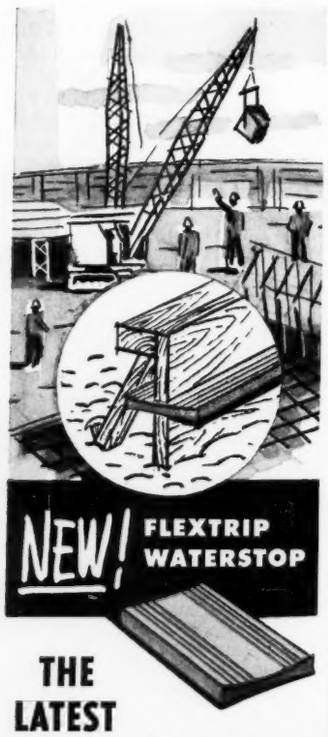
The same fleet of trucks hauled the wearing-course material to the Barber-Greene finisher, which laid a strip 12 feet wide. Whenever possible, the finisher placed one strip for about half of the working day. Then, trucked back to the starting point as previously described, it closed up the second strip during the balance of the day. It was felt that a better joint between the strips was obtained by completing both strips the same day. Compaction of the wearing course was accomplished by two steel-wheel tandem rollers: a Buffalo-Springfield 12-ton and a Galion 10-ton.

The run at Storden included the laying of a 1½-inch wearing course 24 feet wide on a 17.3-mile length of State Route 47. In this case the plant was set up at a gravel pit more than five miles off the highway. On the maximum hauls from this setup, which exceeded 20 miles each way, as many as 44 trucks were required to supply the finisher. The contractor's fleet of 16 International L-160 and R-170 trucks was augmented by hired trucks for these hauls.

Base Courses

W. Hodgman & Sons, Fairmont, Minn., parent company of the Hazelmere Bituminous Co., placed the subbase and base on this project. A 6 to 9-inch course of pit-run gravel screened to 3-inch-maximum size was laid over the old road as a subbase. This course was laid 30 feet wide to provide drainage under the shoulders as well as the roadway. Pit-run gravel for the 3-inch base course was crushed to maximum 1-inch size. This material was windrowed on the grade by dump trucks hauling directly from the crusher. The Adams graders laid out the lifts, and the Tampo rollers provided the compaction.

The compacted gravel base was primed with MC-1 cutback asphalt applied at the rate of 0.22 gallons per square yard by a Rosco 1,500-gallon distributor on an International L-190



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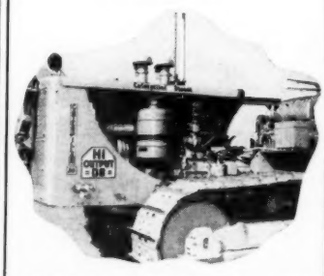

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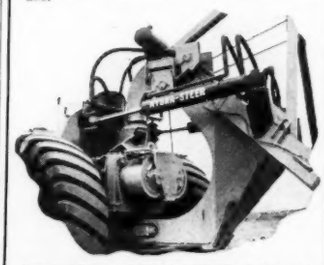

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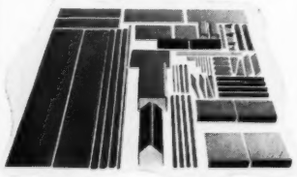

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Despite its size, the Barber-Greene 200-ton-per-hour dryer is easily moved from place to place. The unit uses a rotary drum 20 feet long and 9 feet in diameter.

A close-up of the Barber-Greene hot-mix plant which Hazelmere used on six jobs during a 4-month paving season last year. The mixer, at left, is a standard Model 848 with variations. The dryer is at right, with 16-cyclone dust collector at rear.

truck. The Barber-Greene finisher laid the two 12-foot-wide strips of wearing course over this prime coat in a manner similar to that described on the Sleepy Eye project. The distributor then sealed the surface with an application of 0.12 gallon per square yard of RC-1 cutback asphalt in which a cover aggregate of crushed stone was embedded. Stabilized gravel shoulders 3 feet wide on each side of the pavement complete the section.

Asphaltic materials were received in tank cars at Jeffers and trucked 9 miles to the plant. Three Cleaver-Brooks tank car heaters and a Bros booster heated the asphalt and loaded it into three 1,500-gallon tanks mounted on International trucks.

High Capacity Plant

The hot-mix plant which enabled Hazelmere to accomplish this exceptional season's work consists of a combination of standard and new units. Barber-Greene, in designing the 200-ton-per-hour combination, retained its standard Model 848 mixer, which is adaptable to travel plant as well as single and multiple-aggregate central plant work. Since over 300 tons per hour is often mixed in the pugmill on travel plant or stabilization jobs, it was felt that the mixer was sufficient in capacity for the stepped-up plant.

To match this mixer capacity, the company developed a rotary-drum dryer which, despite the fact that it uses a drum only 20 feet long and 9 feet in diameter, is capable of handling the 200 tons per hour. Both high and low-pressure-fuel oil burner systems are offered, and Hazelmere selected the low-pressure unit. Records on the Sleepy Eye operation show a burner consumption of 2½ gallons of No. 5 fuel oil for every ton of aggregate passing through the dryer. Stack temperatures were recorded at about 300 degrees F.

With the dryer, this contractor used a new B-G Model 848 dust collector. This unit employs a series of sixteen V-mounted, 27-inch-diameter cyclone collectors, and can han-

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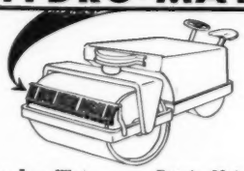

Use Less Water Retain Moisture
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BLAW-KNOX

"COMPLETE PACKAGE"

cuts paving costs on Ohio Turnpike

The first concrete paving on the Ohio Turnpike was finished in December *well ahead of schedule* to speed traffic from the Pennsylvania Turnpike westward. The speedy completion of this contract and the low paving costs are typical of "Complete Package" operations on the majority of turnpike projects.

The Blaw-Knox "Complete Package" gives you advantages you get nowhere else! One source and one responsibility for *all* your concrete paving equipment; one distributor source for prompt maintenance and parts service; low maintenance and high-speed production from the smooth, balanced operation of equipment designed as one "family."

On the Ohio Turnpike job, a Blaw-Knox P-150 Base Paver placed the base material to specifications and a Precision Subgrader brought the subgrade to exact contour and elevation. The contractor also used Blaw-Knox Self-Aligning Road Forms, two Concrete Spreaders (one with vibratory attachment), two Finishing Machines and a MultiFoote 34E Dual Drum Paver.

The Blaw-Knox "Complete Package" also includes Aggregate and Cement Batching Plants, Airport Paving Forms, Clamshell and Concrete Buckets, Road Wideners, Bituminous Paver-Finishers and Adnun Black Top Pavers. See your Blaw-Knox distributor today for the "Package" that's tailor-made with the units *you* need.

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division

Pittsburgh 38, Pa.
Offices in Principal Cities

BLAW-KNOX
EQUIPMENT DIVISION

dle approximately 40,000 cubic feet of exhaust gas from the dryer per minute. This unit, like the others, is mounted on rubber tires. The amount of fines reclaimed from the dust collector was so great that on several occasions it was necessary to disengage one bank of the collector cyclones to keep the fines in the finished mix within specification limits.

Personnel

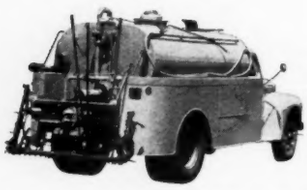
Hazelmere Bituminous Co. is the asphalt paving subsidiary of W. Hodgman & Sons, Fairmont. The parent company has been engaged in road construction for more than 20 years. The founder of the firm, Warren Hodgman, was killed in an automobile accident early in 1954. He was 73 years old. Present principals of the organization are Rupert Hodgman, vice-president, and Kenneth Hodgman, secretary-treasurer.

Superintendent of the bituminous work on the Minnesota projects for Hazelmere was Leonard A. "Speed" Quiram, who has been with the company for nine years. Project engineer for the Minnesota Department of Highways on the Sleepy Eye job was Edward W. Angus. On the Storden project Louis V. Batters served as project engineer. Both projects were located in district 7 of which Nels Johnson is District Engineer. Construction engineer for the Minnesota department is C. L. Methven. Chief engineer is O. L. Kipp.

The Minnesota Department of Highways is headed by Commissioner M. J. Hoffman, with headquarters at St. Paul. THE END

Taking valuable time out to humor the photographer are, left to right: F. D. Wild, inspector for the Minnesota State Highway Department; J. A. "Speed" Quiram, hot-mix plant superintendent for Hazelmere; and T. W. Rake, timekeeper.

PAVING SIMPLIFIED
with CARTWRIGHT
IMPROVED
ASPHALT
DISTRIBUTOR

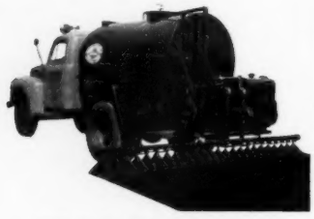


Precision Model with 1,250-gallon tank.

Blacktop paving contractors say that Cartwright Asphalt Distributors are better balanced, more compact, easier serviced and do a better paving job at lower cost of operation. They apply more material per day, year after year.

Manufactured in two models, equipped with Cartwright "Straight-Line" Hot Spray Bars up to 24 feet long, which are full-circulating under pressure. No nozzle drip. Patented circulating system provides balanced pressure when spraying and circulation of 300 gpm for faster heating of spray bar and nozzles. Fan pattern gives light, even application without streaks. Straight line starts and clean cut-off on straight line.

Tank capacity 600 gallons and up. Ford industrial power plant.



"SD" Model with 800-gallon tank.

"SD" Model is moderately priced for limited budget, has 3" pump, 12-foot spray bar, and will mount on 60" cab-to-axle truck.

Write for literature and prices.

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A highly volatile auxiliary fuel for quick starting of Diesel engines. Makes for sure-fire starts in all weather — prolongs battery life — saves time and money. Available at an economical, reduced price.

Case of twenty-four 1 lb. cans—**$28.75** subject to quantity discounts. Freight prepaid on lots of five or more cases.

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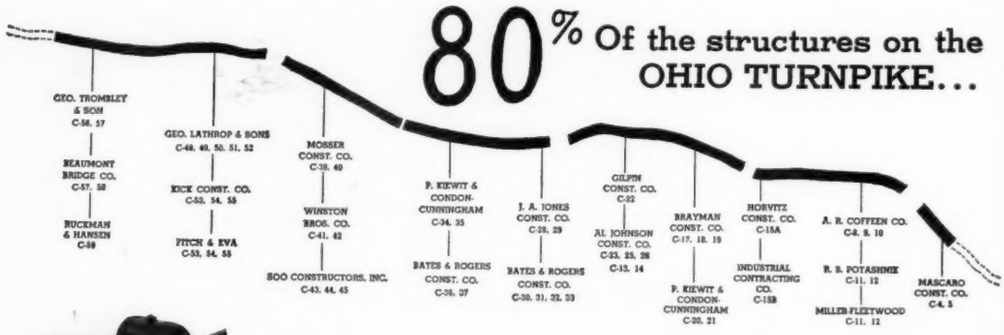
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Canada
Vancouver—Air Equipment Service, Ltd.

Huber-Warco Elects Officers, Directors

The Huber-Warco Co., formed by the merger of the Huber Mfg. Co., Marion, Ohio, and the W. A. Riddell Corp, Bucyrus, Ohio, has elected officers and directors to head the new firm. All officers of the new company have been drawn from the parent companies.

Clark T. McConnell, former president of Warco, was elected chairman of the board, and Don. A. Howard, former president of Huber, was chosen president of the new organization.

The former vice president and general manager of W. A. Riddell Corp., Jacque E. Jones, was named executive vice president, and Ralph Howard, assistant to the president of Huber, was elected vice president. The treasurer of Huber, Robert E. O'Connell, will continue as treasurer of the new organization.

Other officers are F. F. Corfman, assistant treasurer; Baird Johnson, secretary; and Kenneth Roberts, assistant secretary. Four other members of the board of directors, Ewing T. Boles, Thomas F. Dolan, Francis B. Huber, and Jay H. Maish, have also been named.

Manufacturing operations will be continued at the Marion and Bucyrus plants, but general offices will be consolidated in Marion. Huber formerly manufactured three-wheel and tandem rollers and the Huber maintainer, and Riddell had manufactured motor graders and grinding machinery.

Waco Acquires New Line

The transfer of manufacturing and distribution rights for Gyp-C dry wall tools from the Gypsum Ceiling Jack Co., Cedar Rapids, Iowa, to Waco Mfg. Co., Minneapolis, Minn., has been completed. Manufacturing of the line of jacks, props, and carriers for use in dry wall construction will be done in Waco's Minneapolis and Cleveland plants.

Detroit Diesel Division Adds New Training Program

The third phase of its service training program has been established by the Detroit Diesel Engine Division of General Motors Corp., Detroit, Mich. The new program offers one-week courses of specialized training in both the theoretical and practical aspects of two-cycle diesel operation, dynamometer test and maintenance, industrial torque converters, and hydraulic marine gears. The course is designed to supplement those offered by Detroit's mobile schools, but it is not as intensive as the factory training program.

The first of the schools opened in Atlanta, Ga., where courses will be offered for four months. The school will then move facilities to San Leandro, Calif., and Denver, Colo., for similar periods. Specially-trained personnel from the teaching staff of the school.

Owners, operators, and manufacturer's personnel may apply for the course through any Detroit Diesel distributor or dealer.

Fennel Instrument News

Edward Grogan has been appointed sales manager for the line of transits, levels, and theodolites manufactured by Fennel Instrument Corp. of America, Long Island City, N. Y.

Marion Elects Smith

Milton T. Smith has been elected vice president and general manager of the Marion Power Shovel Co., Marion, Ohio, and has assumed a similar position with the Osgood Co., a Marion subsidiary. He was also elected a director of both companies, replacing Louis Goldberg from Marion and the late John Lacey of Osgood.

In his new position, Mr. Smith will participate in all phases of operation within the companies.

Both Marion and Osgood, manufacturers of construction equipment, have been acquired by Merritt-Chapman & Scott Corp., New York, N. Y.

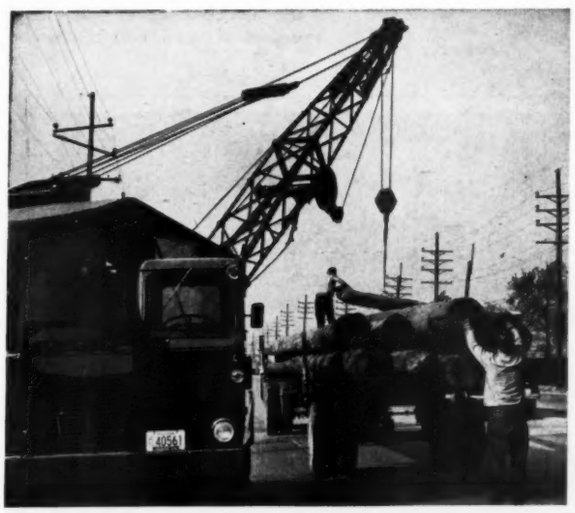
...before it TALKS

...is the way our doctors put it—"Our chances of curing cancer are so much better when we have an opportunity to detect it *before it talks.*"

That's why we urge you to have periodic health check-ups that *always* include a thorough examination of the skin, mouth, lungs and rectum and, in women, the breasts and generative tract. Very often doctors can detect cancer in these areas long before the patient has noticed any symptoms.

For more life-saving facts phone the American Cancer Society office nearest you, or write to "Cancer"—in care of your local Post Office.

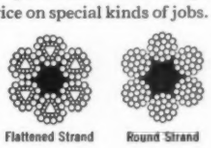
American Cancer Society



PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1, and still tested at higher-than-rated strength. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.



Flattened Strand Round Strand

The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety*. Flattened Strand wears longer and more evenly . . . and is easier on sheaves and equipment.

If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

A Northwest crane with Blaw-Knox ¾-yard bucket feeds aggregates to a nearby 2-ton Heltzel bin. Chevrolet batch trucks drive under the bins for aggregate, then under the Johnson cement plant (right).

C&E Staff Photos

Widened pavement resurfaced with asphaltic concrete

While more than 5,000 vehicles daily keep the roadway in constant use, U.S. 30 through central Nebraska —the Lincoln Highway—is being transformed into a modern highway. The old 20-foot concrete pavement is being widened to 24 feet and resurfaced with asphaltic concrete, and shoulders are being reshaped. One of a series of projects in this improvement program involved a 15.3-mile section between Odessa and Overton, about mid-way across the state. Missouri Valley Construction Co., Omaha, Nebr. did the work last summer under a contract with the Nebraska Department of Roads and Irrigation.

Highway 30, which follows the Platte River in a long double-reverse curve extending from the Iowa border across the state of Nebraska to Colorado, is a favored route of many transcontinental travelers. During the summer months, vehicle counts of 5,000 to 5,500 per day are normal. Since there were no convenient detours in this area, the traffic had to be carried right through the work.

To start the operations, a Caterpillar No. 12 motor grader using a special blade attachment excavated a trench 2 feet wide and 12 inches deep adjacent to the old pavement. The bottom of this trench was thoroughly compacted by a Buffalo-Springfield trench roller which worked immediately behind the motor grader. An Apsco auger-type spreader then deposited a 4-inch layer of fine sand in the trench. This was watered by a 1,400-gallon Chevrolet tank truck with an offset spray bar to provide moisture for compaction. The sand was then compacted by a specially adapted roller with two rolls, each 2 feet in diameter and 2 feet wide.

Sliding Form for Concrete

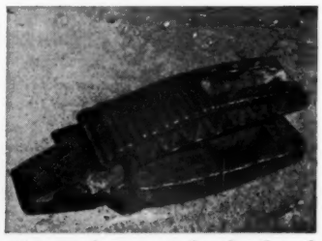
Concrete for the 8-inch widening slab was mixed in a central plant, delivered to the road in dump trucks, and placed with an Apsco spreader. The belt of the spreader delivered the concrete from the hopper to the trench, where it was spread on the compacted sand base, struck off, compacted, and finished by a shop-made slip form towed by the spreader. A Viber electric vibrator powered by a Kohler light plant on

This 5 yard Manitowoc shovel is amply protected at all wear points with Stoody 21.

STOODY 21 helps maintain schedule on Nevada's Highway 40

Stoody 21 has played a part in meeting earth-moving schedules for Morrison-Knudsen, world's largest construction company, on a 2½ million dollar grading job, expanding Nevada's Highway 40 between Reno and Fernley. Contracting to do the job in 170 days, M-K has kept well ahead of schedule.

Equipment used by this division of M-K is customarily hard-faced before it goes into service. On the Nevada highway job this protection was doubly important because of the abrasive nature of the material handled. As routine procedure new shovel teeth, adapters,



All exposed areas of this shovel tooth adapter are hard-faced with Stoody 21.

buckets and ripper teeth were hard-faced with Stoody 21 and maintained with this alloy throughout. Worn teeth were built up by welding a section of grader blade to the point, using low hydrogen electrodes. These teeth were then hard-faced as illustrated. No preheat or heat treatment was used, nor was any effort made to follow a particular hard-facing pattern—the object was simply to get on enough hard metal to do the job.

Because of Stoody 21's resistance to both abrasive wear and impact, average shovel tooth life on this job was extended to two full shifts before rebuilding or refacing became necessary.

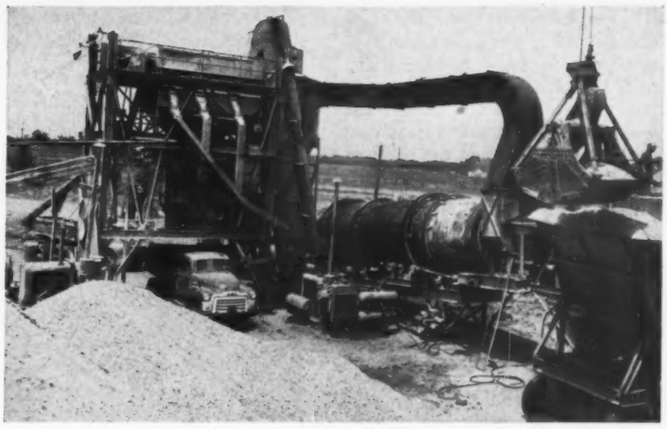
Stoody's hard-facing experience in protecting equipment over the past quarter century is yours for the asking. See your Stoody dealer (consult the yellow pages of your phone directory) and request a free copy of the "Hard-Facing Guidebook," or write direct.

STOODY COMPANY
11936 E. Slauson Avenue,
Whittier, California

Now!
BUY used equipment
SELL used equipment
ACQUIRE competent personnel
through
The Trading Post Section of CONTRACTORS & ENGINEERS
470 4th Avenue, New York 16, N. Y.

See page 155

A Koehring 16-E Twinbatch paver mounted on rubber tires places concrete for the widening slab at an intersection in the village of Overton, Nebr. A truck stands by ready to deliver dry batches.



This Cedarapids hot-mix plant with 4,000-pound-batch pugmill is driven by three GM diesel engines. A GM 4-71 unit operates the large and effective dust collector. In the picture, a GMC truck loads under the plant.

the spreader vibrated the concrete, while a screed struck off excess material flush with the old pavement. A special attachment pulled dirt from the shoulder against the form. As the form moved along, the dirt remained to help hold up the outside face of the fresh concrete. A burlap drag at the rear of the machine applied the final finish. Curing was accomplished by spraying the surface with an asphalt-base curing compound applied from a Hunt sprayer with hand sprays.

At Elm Creek near the middle of the job, the concrete plant was set up in an area between the highway and the Union Pacific railroad tracks. Cement was batched directly from cars by a Johnson plant which handled either bulk cement from hopper-bottom cars or sack cement from box cars. Aggregates were delivered by truck and charged into a set of Heltzel bins by a Northwest crane using a ¾-yard Blaw-Knox clamshell bucket. For the widening operation, the cement and aggregates discharged from the weigh-batchers directly into the skip of a Koehring 16-E Twinbatch paver. This rubber-mounted paver, with its elevating boom, loaded the mixed concrete into the dump trucks which hauled to the job.

An auxiliary concrete plant on the same location consisted of a Winslow Binanbatch setup which discharged into the skip of a stationary Rex 16-S mixer. This plant produced concrete used for patching portions of the old concrete. Wherever the pavement showed signs of failure, it was broken out with air tools powered by Ingersoll-Rand and Gardner-Denver compressors. Concrete was hauled from the mixer in dump trucks and placed and finished by hand.

In the villages of Overton and Elm Creek, the roadway was widened with

(Continued on next page)

ONE MAN and a MAINCO WHEEL can beat 2 MEN using CHAIN or TAPE!

MAINCO DISTANCE MEASURING WHEEL

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THE MAINTENANCE CO., INC.
Dept. P 453 W. 42nd St., N. Y. 36, N. Y.

Speedy Basement Digger Cuts Excavation Costs

LOOK AT THAT LOAD as the INTERNATIONAL DROTT Skid-Shovel uses exclusive Skid-Shoes with pry-out action to apply 11,500 pounds of break-out force to work. The heaped load is retained by 41° bucket roll-back and the paydirt is moved in third gear to the stock pile.

Operator finds INTERNATIONAL DROTT TD-9 Skid-Shovel works faster, handles easier on housing project

The Trowbridge Construction Company, Marshalltown, Iowa, is one of the thousands of contracting firms the country over that has discovered the fastest, most economical way to dig basements is with an INTERNATIONAL DROTT Skid-Shovel.

Here the TD-9 Skid-Shovel is shown starting 75 basement excavations on a new housing project in Marshalltown, and operator Terry Adams says:

"This loader is faster, easier to handle, with plenty of visibility so you can see the work you are doing. It tops all other loaders I've seen."

You'll know what Terry is talking about when you call your INTERNATIONAL Industrial Power Distributor for your demonstration. There are four sizes of Skid-Shovels—⅞, 1¼, 2 and 3 cu. yds.—and they all have Skid-Shoes and use pry-out action to supply 300% greater break-out force. Loading force is transmitted into the ground and the units transport heaped loads at ground level in high gear to speed every cycle. Call today for your demonstration and see how they'll cut your excavation costs.

FULL HEAPED LOAD is retained during transport and dumped on the stock pile without spillage. The highest lift, farthest pitch feature pays off big for loading out haul trucks with high bodies.

INTERNATIONAL® DROTT

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS
DROTT MANUFACTURING CORP., MILWAUKEE 8, WISCONSIN

(Continued from preceding page)

concrete paving and a low island constructed to separate through traffic from the local traffic. On these sections, the Koehring paver was brought to the site and materials were dry-batched from the plant to batch trucks which supplied the paver. This concrete, which was not to be covered with blacktop, was carefully finished and cured with wet burlap. Joints were sawed to a depth of 2½ to 3 inches with a Clipper concrete saw using a 12-inch diamond blade. This joint was carefully cleaned with an air jet from an Ingersoll-Rand 125-cfm Gyro-Flo compressor and filled with Presstite 77 cold-applied rubber-asphalt joint compound. A Graco pump operated by air from the compressor pumped the compound from the barrel to the hand-held nozzle.

A Barber-Greene finishing machine lays the first 1½-inch course of asphaltic concrete over the widened concrete pavement. A Galion 8 to 10-ton tandem roller follows closely.

Asphaltic Concrete Surface

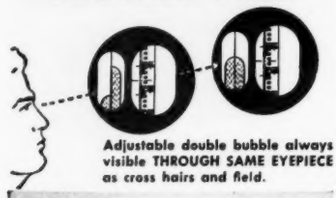
With the old pavement widened and patched, the next step in preparing for the resurfacing was to remove the old joint filler. A Caterpillar 12 motor grader using a single scarifier tip cleaned out the center joint, blading the loose material to the side as it went. A Hough power broom towed behind the grader swept the joint clean. Transverse joints were cleaned by an International M tractor with a special hydraulically controlled scraper attachment, and old joint filler was carefully removed.

Final preparation of the old pavement consisted of the application of a fog coat of RC-1 cutback asphalt by an Etnyre distributor mounted on a Chevrolet truck. Hot asphaltic concrete was delivered to the Barber-Greene paver, which laid a 1½-inch course over the concrete. Two Galion 8 to 10-ton tandem rollers followed the paver to compact the material. This course was then tacked with a fog coat of RC-1 and a second course of the same material. The bituminous resurfacing was started on June 11, and the entire 15.3-mile section requiring—39,000 tons of asphaltic concrete—was completed by the first week in August. Crews worked 11-hour days five days a week, leaving the roadway as clear as possible on weekends.

Hot-mix was produced in a 4,000-pound Cedarapids plant set up between the Union Pacific tracks and the highway just west of Elm Creek. Three GM diesel engines provided power to operate the plant. One of these, a 4-71 model, operated the efficient dust collector. The other two, both 6-71 models, drove the 88-inch dryer, cold and hot elevators, and the pugmill. Electrical energy for a number of motors on the plant and for electrical controls was generated by a 220-volt, three-phase

SURVEYING NEWS

NEW LEVEL WITH DOUBLE BUBBLE IS "MISTAKE-FREE"



Adjustable double bubble always visible THROUGH SAME EYEPIECE as cross hairs and field.

- No need to turn telescope during leveling
- No need to look anywhere but through telescope to adjust level at any turn after initial set-up
- American type — erecting eyepiece, 4 leveling screws
- Unbelievably fast and accurate, yet simple-to-use. Economical!

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11-27 44th Rd., LONG ISLAND CITY, N. Y.

Please send me Booklet D with information on Fennel...

☐ Double bubble ☐ Alidades
☐ Other levels ☐ Callimeters
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ADDRESS.....

.....

Superior Pipebooms help cross a canal

Four Superior Pipebooms, mounted on powerful Internationals, provide the mighty slings necessary to feed this 240′ section of pipe across the McIvor Canal, near Batesville, Mississippi.

Part of a 45-mile loop on the Tennessee Gas Transportation Company's main line from Campbellsville, Kentucky to Natchitoches, Louisiana, this 26-inch, natural gas pipe (½" wall thickness) is bent and plugged, ready for immersion. Adding to the already heavy load are a dozen 3280-pound river weights at 20-foot intervals, to counteract the buoyancy of natural gas. (*Contractor: The H. C. Price Company of Bartlesville, Oklahoma*).

When the going is rough—or wet—you can count on Superior Pipebooms!

Perhaps our engineers can help you with your next pipelaying job. Feel free to write for information.

SUPERIOR *Equipment* COMPANY

BUCYRUS, OHIO

In Southern California It's

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7.5-kva Caterpillar diesel generator set.

Heat Transfer Oil

Natural gas, piped in from a nearby pipeline, was burned in the dryer and also in the Hy-Way heater which took the place of the customary steam boiler. Heat-transfer oil in the Hy-Way unit was heated to temperatures of from 350 to 370 degrees F and circulated at a pressure of not more than 30 pounds. Asphalt cement was stored in two tanks having capacities of 9,500 and 17,000 gallons, respectively. The heat-transfer oil was circulated through coils in these tanks. The oil supply bucket and pugmill jacket in the plant were also heated with this oil.

The contractor transported asphalt cement from the refinery at Phillipsburg, Kans., in 4,500-gallon insulated transports pulled by Mack A-54 tandem-axle trucks. Crushed rock was delivered to the plant by rail in hopper-bottom cars from South Bend, Nebr. A Barber-Greene under-track belt conveyor and an inclined conveyor unloaded the cars and delivered the material to the stockpile. Mineral filler arrived by rail from Weeping Water, Nebr., in bulk cars and was unloaded to dump trucks by a Johnson under-track screw conveyor. From a truck hopper, the dust was fed into the plant by an inclined covered belt conveyor. Sand and gravel produced locally were delivered to the plant stockpiles by truck.

From the stockpiles, three types of aggregate were charged into a three-compartment bin by a Northwest crane using a 2-yard clamshell bucket. Calibrated gates in the bottom of the hopper fed the aggregates in the desired amounts to the cold elevator, which carried them into the dryer. Typical proportions of the asphaltic concrete mix were:

Asphalt cement (85-100 pen.)	5 per cent
Crushed limestone (1 in. max.)	36 per cent
Sand and gravel (3/4-in. max.)	44 per cent
Dune sand (fine)	20 per cent
Mineral filler (dust)	5 per cent

French Drains

Following the subsurface crew closely was a shouldering crew which brought up select borrow material and built shoulders 6 feet wide on each side of the pavement, with 3 to 1 slopes to the ditches. Some of the material was cast into place with a Northwest dragline, some was loaded by the dragline to trucks and hauled to the shoulders, some was placed by a Tournapull D Roadster. Two Caterpillar 12 motor graders shaped the material to match the pavement and slope toward the ditches. Compaction was provided by two sheepsfoot rollers pulled by International M tractors, and final compaction by a 13-wheel Bros rubber-tire roller also pulled by an M tractor.

After the shoulder was placed and compacted, French drains were installed every 100 feet. A Jeep-A-Trench dug trenches 12 inches wide and 16 inches deep on a skew of 30 degrees with the flow of the draining. These ditches extended from the edge of the pavement out through the shoulder slope. A 4-inch lift of sand and gravel was placed in the bottom of the trenches, and the remainder was backfilled with the shouldering material which had been excavated.

Headquarters for contractor operations at the site was an office trailer.

Personnel

Bill Grewcock supervised the concrete work for Missouri Valley Construction Co., and Lyle Westerbeck was superintendent of the asphalt resurfacing operation. Project engineer for the Nebraska Department of Roads and Irrigation was Robert Morrisey. L. O. Graham is construction engineer for the department, and L. N. Ress is state engineer.

THE END

New Officers Elected By Asphalt Institute

At the annual meeting of the Asphalt Institute in New York, H. B. Pullar, president of Berry Asphalt Co., Magnolia, Ark., was elected chairman of the executive committee for the coming year. J. E. Buchanan will continue to serve as president.

Five vice presidents, chosen to represent the five U. S. geographical divisions on the executive committee, are F. R. Field, representing the Atlantic-Gulf Division; E. V. Linder, from the Ohio-Great Lakes Division; C. E. Defabaugh, from the Midwest Division; D. C. Arnold, representing the Southwest Division; and N. H. Angell, for the Pacific Coast Division. Raymond Harsch will serve ex officio as retiring chairman.

Other officers elected are Arvin S. Wellborn, secretary; George R. Christie, treasurer; and John N. Smith, assistant treasurer.

The institute, effective January 1, set up new national headquarters on the campus of the University of Maryland, College Park, Md. The move was made to facilitate research and engineering operations.

Handle 132 jobs in 17 months *with no trailer expense*

Kanda Brothers, Lexington, Nebraska, save time and expense by driving their 2 Tournatractors to all their assignments. This mobility has enabled them to handle 132 land-leveling, dozing and other dirtmoving jobs in the past 17 months. The units average 12 mph through traffic . . . complete many contracts in less time than it would take just to load and unload a crawler.

For example, on a typical working day, one of the rubber-tired tractors drove 9 miles northwest of Lexington to level an alfalfa field for irrigation. The other machine drove through town to dig a basement for an addition to the Lexington Community Hospital. The cross-town trip took about 10 minutes; the 9 miles about 45 minutes. Both units towed an LP Carryall.

100 to 120 yds. hourly on 1200′ haul

On the land-leveling job, the first Tournatractor self-loaded its 15-yd. LP with 10 to 12 pay yards of root-laced silt loam. Load time averaged 1½ minutes. Output on typical 2500′ cycles averaged 10 loads per 55-minute hour. Entire 3500-yd. job was finished in 4 working days by the one rubber-tired machine.

Cuts on land-leveling job are long and thin (usual loading distance: 175 to 500′). Operators say that under normal conditions self-loading Tournatractor easily heaps the 15-yd. scraper in about 1 minute.

Digs 1100-yd. basement in 1 day

On the basement excavation, Tournatractor had to pull the loaded LP down an alley, cross a paved street, go over curbing and spread in a field 400′ from the cut. As the 40 x 100′ hole got deeper, grades got steeper. Topsoil was sorted and stockpiled; the under-lying wet, slick, root-laced clay and sand wasted. In spite of these tough conditions, Tournatractor dug the 1100-yard hospital basement in 1 day . . . was on another job at starting time the following morning.

2½ loads hourly over 5-mi. cycle

Production here follows contractors' overall records which show that Tournatractors, self-loading the LP's, each average from 67 to 143 pay yards per hour on 400′ to 2800′ hauls. Even on a 2½-mile haul through traffic (grading Lexington airport), each machine delivered 2½ loads, or 25 to 30 pay yards hourly.

On other kinds of tractor work output is equally good. Pulling a LeTourneau Rooter, for instance, one of the machines deep-plowed a 30-acre cornfield to a depth of 18 inches in 8½ hours.

2 tires last over 10,000 hours

On all jobs, machines have experienced only 5 to 10% downtime for repairs. After 5 seasons of work, totaling about 10,000 hours, the oldest Tournatractor is still running on two of its original tires. "Tournatractor saves at least 30 minutes a day greasing over a crawler," says Partner S. Kanda.

Carryall, Rooter—Trademark Reg. U.S. Pat. Off., Tournatractor—Trademark T-470-B-b

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Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
N56	4	2¼	3½	56	14.2 @ 2200 RPM
N62	4	2⅜	3½	62	15 @ 2200 RPM
Y69	4	2½	3½	69	21.4 @ 2400 RPM
Y91	4	2⅞	3½	91	28.5 @ 2400 RPM
Y112	4	3 1/16	3½	112	32 @ 2400 RPM
F124	4	3	4½	124	36 @ 2400 RPM
F140	4	3 1/16	4½	140	42 @ 2400 RPM
F162	4	3 7/16	4½	162	49 @ 2400 RPM
F186	6	3	4½	186	60.5 @ 2400 RPM
*E201	4	3⅝	4½	201	59 @ 2000 RPM
F209	6	3 1/16	4½	209	68 @ 2400 RPM
F226	6	3 1/16	4½	226	73 @ 2400 RPM
F244	6	3 7/16	4½	244	79 @ 2400 RPM
M271	6	3⅝	4½	271	86.2 @ 2400 RPM
M290	6	3¾	4½	290	92.2 @ 2400 RPM
M330	6	4	4½	330	104.4 @ 2400 RPM
M363	6	4	4 13/16	363	109 @ 2000 RPM
B371	6	4½	4½	371	110 @ 2400 RPM
B427	6	4 1/16	4½	427	127 @ 2400 RPM
G134	4	3½	4½	134	32.2 @ 2000 RPM
G157	4	3½	4½	157	37.7 @ 2000 RPM
H227	4	3½	5½	227	52 @ 1800 RPM
H243	4	3¾	5½	243	56 @ 1800 RPM
*H260	4	3⅞	5½	260	60 @ 1800 RPM
T371	6	4½	4½	371	119 @ 2400 RPM
*J382	4	4½	6	382	74.2 @ 1400 RPM
T427	6	4 1/16	4½	427	140 @ 2400 RPM
U501	6	4½	5¼	501	160 @ 2400 RPM
R513	6	4½	5½	513	164.3 @ 2400 RPM
R572	6	4¾	5½	572	182.4 @ 2400 RPM
R602	6	4⅞	5½	602	191.7 @ 2400 RPM
S749	6	5¼	5½	749	217 @ 2200 RPM
S820	6	5½	5½	820	237 @ 2200 RPM

INDUSTRIAL DIESEL ENGINES

Model	Cyl.	Bore	Stroke	Displ.	Bare Engine H.P.
GD157	4	3½	4½	157	39 @ 2000 RPM
*ED201	4	3⅝	4½	201	45.8 @ 2000 RPM
HD243	4	3¾	5½	243	54.7 @ 2000 RPM
*HD260	4	3⅞	5½	260	59.3 @ 2000 RPM
*JD382	4	4½	6	382	72.5 @ 1600 RPM
TD427	6	4 1/16	4½	427	106.5 @ 2000 RPM
RD572	6	4¾	5½	572	142.5 @ 2000 RPM
SD802	6	5 1/16	5½	802	202 @ 1800 RPM

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Control heat in materials for good winter concreting

Cold weather inevitably brings problems to a contractor engaged in producing concrete structures. He has to secure good results without delays or overtime to make the job pay. He has to strip forms and remove shoring as early as possible and get the structure into use. He has to make sure concrete is properly cured.

Doing all this becomes relatively easy if measures are taken to offset the effect of low temperatures on the concrete he uses. The contractor may use an accelerator in the concrete or use high-early-strength cement, and arrange for protective covering for the concrete. Depending on the temperatures to be expected, any one or all of these measures can be used.

The normal temperature for placing concrete is about 70 degrees F. At temperatures of about 50 degrees, little difficulty is encountered. But below this, setting and hardening processes are slowed. Below 32 degrees, the freezing point of water, any reaction between water and cement ceases.

The setting and hardening process involves a chemical change in the concrete which depends largely upon the temperature of the mix. An increase in the curing temperature will cause this change, or hydration of the concrete, to be more rapid. At the same time, the material will show a higher rate of gain in strength.

The heat evolved by the hydration reaction will alter temperature conditions in most structures. The amount of heat developed depends on the amount of cement in the mix. Rich mixes will evolve large amounts of heat; lean mixes will develop less heat. The temperature is affected also by the size and shape of the structure and the chemical composition and fineness of the cement.

Preparation

To keep the temperature of concrete at the desired level and to permit early finishing of a sound structure, the contractor should first make sure that ice, snow, and frost are removed from any area which comes into contact with the concrete. This includes forms, reinforcements, and similar surfaces. Concrete should not be placed on a frozen subgrade, for when this subgrade thaws, uneven settlement or a cracking in the concrete may result.

Nor should a thin layer of concrete be placed on cold hardened concrete. This will result in bond failure, since the thin layer will shrink and the lower layer will expand as cooling takes place. The temperature of both should be approximately the same, and this may require that the base be warmed.

Special care of grouting equipment is required. Heat will be conducted away from the grout rapidly if the bedplates of the machines are at a low temperature, resulting in slow hardening or setting.

Concrete should be placed at a near normal temperature—from 70 to 90 degrees. The minimum is about 50 degrees for structural concrete and 40 degrees for mass concrete. These temperatures can be attained by heating the materials, water, and fine and coarse aggregate. The cement itself should not be heated.

Heating Materials

Sometimes, it is sufficient to heat only the water to secure the desired

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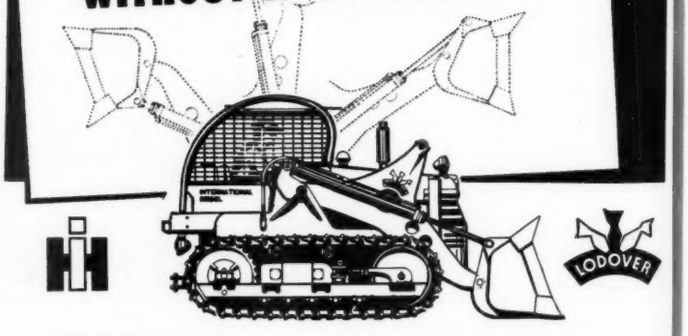

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CONTRACTORS AND ENGINEERS

Temperature of new concrete can be maintained by heating units, type of cement, and accelerators

temperature. If weather is severe, aggregates should also be heated. For moderately cold conditions, calcium chloride may be added to the mix. This serves the same purpose and is more convenient.

In temperatures above 30 degrees, mixing water should be hot enough to bring the concrete to between 50 and 80 degrees at the mixer. For jobs requiring less than 20 cubic yards of concrete, the material may be heated simply by using a torch inside the mixer.

In temperatures between 30 degrees and zero, both water and fine aggregate should be heated so that concrete in the mixer is between 50 and 90 degrees. In temperatures below zero, fine and coarse aggregate as well as water should be heated to give concrete the required temperature.

It is important that the temperature of the water does not fluctuate between batches. If aggregate or water is heated to more than 100 degrees, the loading sequence at the mixer can be scheduled so that cement does not come into contact with the hot materials and result in a flash set.

In heating aggregate, it is necessary to avoid extremes. Ice, snow, and frozen lumps must be eliminated, but overheating or excessive drying should not take place. Aggregate temperatures should be no more than 212 degrees, and an individual batch should not be more than 150 degrees. If aggregate is thawed or heated by steam coils, the exposed surface of the material may be covered with tarpaulins so that heat is distributed evenly. For smaller work, this material may be thawed over culvert pipes containing fires.

Accelerators

Calcium chloride is commonly used to speed finishing and for high early strength in the concrete. At moderately low temperatures, 1 or 2 per cent of calcium chloride will counteract the retardation of finishing time. The addition of the chemical to the mix is probably the simplest, least expensive, and most effective way of protecting concrete against cold weather. But by itself it will not afford enough protection against extremely cold weather. In this case the mix must be heated, whether or not calcuim chloride is used.

This chemical, also used for curing and to prevent freezing, sets up an accelerating action which increases the hydration of the cement. Thus the rate of heat development is increased, raising the temperature of the concrete. The effect is to hasten the set of cement, increase its early strength, and develop heat more rapidly during the setting and early hardening stages.

Using an accelerator, the contractor is able to remove forms earlier, reduce the curing period, reduce the time required for protecting the concrete, and put the structure in service earlier.

Since the effect of calcium chloride varies with different brands of cement, contractors should take temperature differentials into consideration before using the chemical.

The use of Type III or high-early-strength cement can also increase the rate of strength development and, under suitable conditions, maintain the concrete at the required temperature for curing. However, it does not always solve the finishing problem.

(Continued on next page)

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(*Continued from preceding page*)

For this, calcium chloride is probably more reliable and more economical.

The use of Pozzolith in concrete calls for the same cold-weather precautions to be taken with ordinary concrete. Concrete made with Pozzolith retains water longer, particularly in cold weather when drying conditions are poor. This will affect the length of time which must elapse before finishing can be done.

Although similar concrete mixes—with or without Pozzolith—set and harden at the same time, the rate of strength gain of concrete with Pozzolith at low temperatures is slightly less. This is because a mix with Pozzolith uses about 15 per cent less cement. And in cold weather, this factor will influence the hardening of the concrete.

Protecting Fresh Concrete

The contractor should arrange for protective coverings well in advance of concrete placement. If temperatures do not fall below 30 degrees, flat slabs can be protected adequately with insulating mats or canvas, covered with at least 8 inches of hay or straw. In lower temperatures, artificial heat may be used inside the coverings so that the concrete surface is at a temperature of 40 degrees at its coldest point and not more than 100 degrees at its hottest point.

Coverings or housings can be of wood, canvas, Sheetrock, Celotex, Sisalkraft, tarred paper, plywood, or any similar material. They should be safe from damage by wind or snow loading and, if possible, fireproof. Heating units must be attended constantly, and fire-fighting apparatus should be located nearby.

To insure that only a few feet of finished slab is exposed to the outside air, tarpaulins covering floor slabs should be placed on supports as soon as concrete is placed. These coverings should allow warm air to be circulated at both the top and bottom of the slab. Also effective in preventing freezing are layers of Celotex placed directly on the concrete.

While concrete is curing, these coverings should be left in place. They may be removed temporarily to allow additional forms or concrete to be placed. Good heating sources are radiators, unit heaters, or coke or oil salamanders. To prevent the concrete from drying out near these units, the heaters may be elevated and concrete nearby covered with sand which is kept wet. Live steam is a particularly good source of heat since it provides moisture as well as heat.

New concrete made with ordinary cement should be maintained at 50 degrees or higher for 7 days, or 70 degrees or higher for 3 days. For the next 4 days, it is a good practice to keep the temperature at a minimum of 40 degrees. If high-early-strength cement is used, the temperature should be 70 degrees for 2 days, or 50 degrees or more for 3 days.

Hardened surfaces should be no more than 100 degrees during the curing period. When heating units and coverings are removed at the end of the curing period, the temperature of concrete made with ordinary cement should not be allowed to fall more than 40 degrees in 24 hours. For concrete made with high-early-strength cement, the drop in temperature should not exceed 20 degrees in a period of 24 hours.

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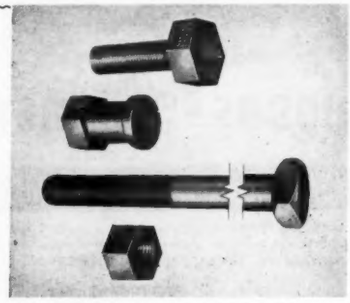

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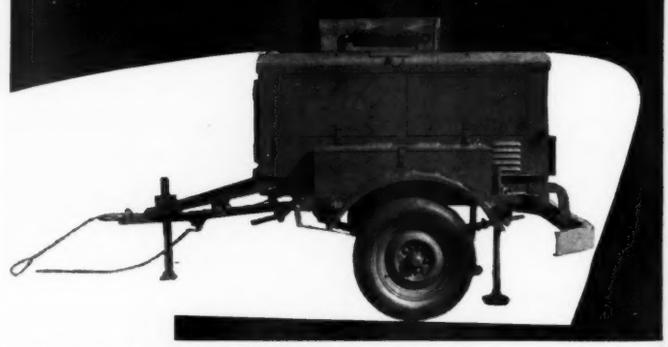

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Form Removal

Because of the various factors influencing the development of required strength, the removal of forms and shoring should be referred to the engineer on the project. His decision depends on the date of concrete placement, temperature conditions prevailing between placement and stripping, and the probable strength of the concrete. Air temperatures outside and inside the enclosure, and at the concrete surface, should be recorded by date and hour and preserved for reference when the time for stripping approachs. Thermometers may be embedded in the concrete surface so that readings can be taken at the start and end of a work day.

While most contractors today recognize the need for taking precautions against cold weather, many encounter difficulties because they are unprepared for a moderate drop in temperature which may have an important effect on the job. To be on the safe side, adequate protection should be planned for concrete jobs, even if temperatures are only sliding slowly to their low point for the season. These protective measures will often pay off. And their additional cost will more than offset a probable loss due to cold-weather delays or an unsatisfactory structure.

THE END

From technical bulletins of The Master Builders Co., Cleveland, Ohio.

New Koehring Salesman

E. S. McCormick has joined the staff of the Koehring Co., Milwaukee, Wis., as sales representative to railroads.

From his headquarters in Chicago, Mr. McCormick will also represent Kwik-Mix Co., Port Washington, Wis., and C. S. Johnson Co., Champaign, Ill., both Koehring subsidiaries. The former company makes bituminous and concrete mixers and Johnson produces clamshell buckets.

Perfect Vision

To the Editor:
CONTRACTORS AND ENGINEERS

On page 42 of your December edition you have an interesting photograph relating to the Western Contracting Corp's. job on the Ohio Turnpike.

The description of the photograph says that a Caterpillar 80 scraper is being pushed and pulled. One unit is identified as a Caterpillar, the other, as an Allis-Chalmers. We believe if you'd observe the photograph closely that you'd notice that the scraper is being handled by two Allis-Chalmers HD20 tractors.

Very truly yours,
E. S. Schroering,
Williams Tractor Co., Inc.
Louisville, Ky.

We're sorry for that one error among the 154 illustrations in the December issue—Ed.

Gar Wood Assigns Two New Sales Executives

Leo M. Brown has been appointed assistant to the director of sales and advertising of Gar Wood Industries, Inc., Wayne, Mich.

He will be responsible for all sales functions including education, evaluation, and analysis of the customers and markets for such Gar Wood products as dump bodies, hydraulic hoists, ditchers, and other road-building equipment.

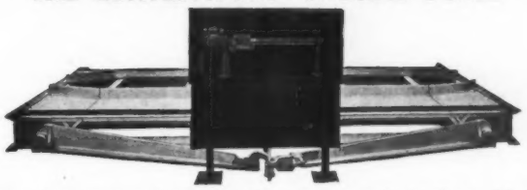
Formerly sales manager of Gar Wood's St. Paul Hydraulic Hoist Division, Mr. Brown has served in various sales capacities with the company since 1949.

In order to develop a greater sales penetration in the Buffalo, N. Y. area, the company's truck-equipment branch in that city has been reorganized under the management of E. J. Griffiths.

Leon D. Sweeney, former branch manager, has been assigned to the field and will work closely with special truck-equipment users in the construction field.

A $5 or $10 contribution for Korea will get the New Year off to a good start. Send to CARE, 600 1st Ave., New York, N. Y.

WINSLOW—PORTABLE TRUCK SCALE
"THE CONTRACTORS' SPECIAL SCALE"

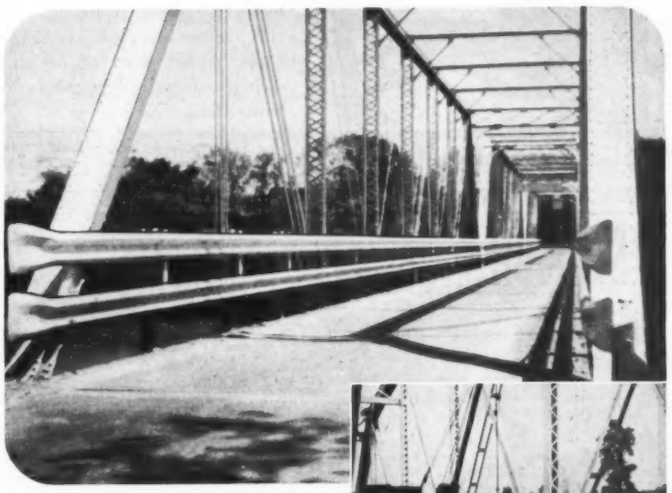


For use at temporary and permanent locations—at stock piles and by bituminous material contractors at the job site. Capacities: 15-18-20-30 tons.

Write us for name of your nearest distributor.

WINSLOW SCALE COMPANY
P. O. Box 1198 Terra Haute, Indiana

Low-Cost "team" reduces Bridge Reconstruction costs!



USF
STRUCTURAL-PLATE
BRIDGE FLOORING
AND
TRAFFIC RAIL

Two big items in bridge reconstruction—new floors and traffic rails—are effectively and economically supplied with this tried and proved "team."

USF Structural-Plate Bridge Flooring is a deep box corrugated steel floor section that ideally replaces worn plank floors with an all-steel foundation for bituminous surfacing. It reaches you prefabricated to your roadway width, ready to place and weld directly to the floor stringers. No special handling equipment is required.

Other member of the team—USF Barrier-Beam Guard Rail, is a beam type section that is thoroughly adaptable to bridge rail service. Its narrow section requires only 3" of roadway width and its high strength and deflection properties permit its direct mounting to bridge structure without use of spring mounts.

Use the USF "team" together on your next bridge reconstruction. Get fast, low cost floor replacement and complete structure protection without sacrifice of roadway.

Write for complete engineering bulletins, USF Bridge Flooring and USF Guard Rail.

USF UNITED STEEL FABRICATORS, INC.
WOOSTER, OHIO

Structural-Plate Bridge Flooring • Barrier-Beam Highway Guard Rail • Corrugated Metal Drainage Products • Prefabricated Steel Buildings • Steel Doors and Frames

Why do most advertisers prefer Contractors and Engineers?

Advertisers always follow readers, and readers of C&E know it is the most complete purchasing guide of any monthly construction magazine.

Month after month C&E carries more editorial news items on new construction machinery and materials. And year after year it carries more advertisers than any other single magazine.

More editorial material, plus more advertisers, add up to the most complete package of information available anywhere.

If you have any special requests, our Service Department will be delighted to hear from you.

Contractors and Engineers
magazine of modern construction
470 Fourth Avenue, New York 16, N. Y.

DISTRIBUTOR DOINGS

This western equipment distributor cut down his sales force and concentrated on maintenance when the market tightened up

Dealer counters sales drop by emphasizing parts and service

A flexibility of operation which enabled it to cope with an equipment market drop during last year's construction season has proved a highly profitable characteristic of Studer Tractor & Equipment Co., Casper, Wyo. By eliminating much of its sales force, concentrating on parts and service operations, and stepping up promotion work in towns where Wyoming contractors are located, this prominent dealer firm has been able to economize and still realize a profit.

The need for some shift in the company's emphasis became apparent when Wyoming's 1954 construction program began to indicate an unusual season. Although the state's dollar volume, as such, was as high as in any other year, there was generally very little dirt-moving, dam work, or other type of excavation scheduled during the year. Much of the Wyoming State Highway Department's dollar volume, for example, was concentrated in rock crushing and oiling jobs. And contractors who were successful bidders on these items had most of the required equipment on hand.

According to Gordon Studer, general manager of the Casper firm, tabulations which he based on conditions over the whole state showed a definite slump in new machine sales.

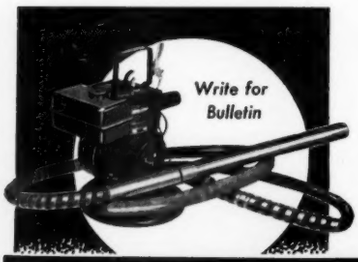
"It wasn't just our firm that was standing still: nobody was selling to the contractors," he explained. "A few tractors moved, but that was about all. In $600,000 worth of work in one salesman's territory, we sold only a Gorman-Rupp pump, a small compressor, and a Seaman Trav-L-Plant. There was no longer any point in maintaining a sales force to deal with contractors who obviously were well stocked with equipment."

Shift in Emphasis

Something had to be done if the Studer company was to survive such a slump in sales. To begin with, the firm laid off most of its sales force. Gordon and his father, R. A. Studer, president of the company, again assumed full charge of both sales and management. One especially good salesman with mechanical ability was transferred to the Casper headquarters shop to bolster the service force.

An improved parts inventory was established, and fast delivery was emphasized. Thus contractors dependent on Studer for parts could get them promptly and avoid downtime on their machines.

Gordon Studer feels the shift in emphasis has paid off well. Costly

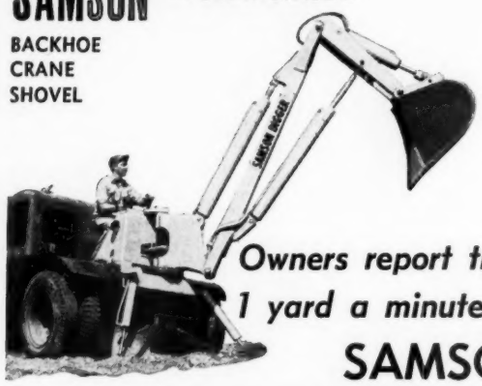


ROETH LIGHTWEIGHT PORTABLE VIBRATOR UNIT with many time saving applications. Fits right into the Contractor's daily work —sanding, wire brushing, grinding, surfacing, drilling. Powered by 2-H.P. Air-cooled Gasoline Engine. Direct take-off from engine crank shaft permits variable speeds in Vibrator Head.

ROETH VIBRATOR, INCORPORATED | 9229 CHESTNUT ST. FRANKLIN PARK, ILL.

SAMSON —FULL HYDRAULIC

BACKHOE
CRANE
SHOVEL



Owners report trenching 1 yard a minute with a

SAMSON

SAMSON'S BASIC UNIT AT $3975.00 OPENS A NEW PRICE FIELD FOR VOLUME SALES

Valuable franchises now open

MEET US AT THE A.E.D. MEETINGS

AVERY TRACTOR

SAMSON

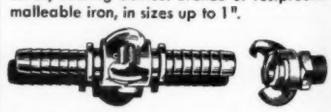
WEST LEBANON, N. Y.

THIS *Versatile Coupling*

while used primarily for air-operated tools in field and factory, is equally efficient for water, oil and spray service. Illustration shows hose end and female I.P.T. end connected.

"AIR KING" QUICK ACTING UNIVERSAL HOSE COUPLING

Heads are locked by pressing together and giving quarter-turn. These locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose, or hose and pipe, within the "AIR KING" size range. Equipped with patented safety locking device. Bronze or rustproofed malleable iron, in sizes up to 1".



Two Hose Ends Connected — Male I.P.T.End

Stocked by Manufacturers and Distributors of Industrial Rubber Products

DIXON *Valve & Coupling Co.*

GENERAL OFFICES & FACTORY—PHILADELPHIA 22, PA.
BRANCHES—CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON
DIXON VALVE & COUPLING CO., LTD., TORONTO, Associate Companies

WILKINSON LINE LOCATOR

REDUCES COST

1. Spots all pipe and cable locations before uncovering.
2. Indicates depth, too.
3. Leading utilities everywhere use it to reduce job costs.

WILKINSON PRODUCTS COMPANY
3987 Chevy Chase Drive — Pasadena 3, California — SYlvan 0-4314

overhead has been eliminated and firm expenses are held to a minimum. Also, the company has been able to reject some particularly risky business, which it might otherwise have taken.

There are indications at present that early spring of this year will see several heavy excavation and construction projects let in Wyoming. If so, Studer will probably enlarge its sales force as necessary. For, as during last year's slump, the requirements for the best possible field service will govern the company's policy.

THE END

Koehring Names Dealers

The Dalrymple Equipment Co., 2635 Summer Ave., Memphis, Tenn., was recently appointed exclusive dealer in the locality by Koehring Co., Milwaukee, Wis. The distributor will handle the complete line of Koehring heavy-duty construction equipment, along with products manufactured by the Parsons Co., Newton, Iowa, and Kwik-Mix Concrete Mixer Co., Port Washington, Wis., wholly-owned subsidiaries of Koehring.

Aside from the Memphis area and the western portion of Tennessee, Dalrymple will cover the eastern border counties of Arkansas and the northwest sector of Mississippi.

A similar distributorship covering the state of Florida has been established with the appointment of the Florida Equipment Co. to handle the Koehring line. In addition to the main office at 10 Stockton St., Jacksonville, the firm has branch offices at 1228 S. W. First St., Miami, and 1108–1110 Twiggs St., Tampa, which will offer sales and services. W. S. Richardson is general manager of the organization.

Blackburn to Represent Various Manufacturers

A new Darien, Conn., representative for a number of construction equipment and highway equipment manufacturers is L. A. Blackburn, Jr., Products for Engineering Construction. The firm has been set up by Leonard A. Blackburn, Jr., who recently resigned as sales manager for the New York office of Armco Drainage & Metal Products, Middletown, Ohio. He had been with Armco for more than eight years.

The Blackburn organization will handle products for highways and various phases of municipal and industrial construction. Its line will include traffic and safety signs manufactured by Eastern Metal of Elmira, Inc., Elmira Heights, N. Y.; traffic markers manufactured by the Lofland Co., Dallas Texas; and products of the New England Metal Culvert Co., Boston, Mass. Armco products will also be handled, except for sales to highway departments.

The company will cover a territory extending from Virginia to Maine, and west to Ohio.

Johnson Names Dealers

The C. S. Johnson Co., Champaign, Ill., a wholly-owned subsidiary of Koehring Co., has appointed five new dealers to handle its line of concrete-batching and cement-handling equipment.

Cook Brothers Equipment Co., 444 Eighth St., San Francisco, Calif., will represent the company in central and northern California. Also in California, the Moore Equipment Co., Stockton, and Bay Cities Equipment, Oakland, will handle the Johnson line of clamshell buckets.

Representing the firm in northwest Texas, east of the Pecos River, is the W. L. Johnson Machinery Co., Midland. The entire state of Alabama and the Panhandle of Florida will be serviced by G. C. Phillips Tractor Co., 4419 First Ave. N., Birmingham 6, Ala.

Keremi Replaces Wilson

Keremi Tractor & Equipment Co., Cheyenne, Wyo., has succeeded the Wilson Equipment & Supply Co. as representative of the lines of construction equipment formerly handled by Wilson.

Huber Names Distributor

The recently-formed Santa Fe Equipment Co., Inc., an affiliate of Electric Tool & Supply Co., Inc., Los Angeles, Calif., has been appointed by the Huber Mfg. Co., Marion, Ohio, to handle its complete line of three-wheel and tandem rollers and the Huber maintainer and motor graders.

The firm, headed by Max Eggerts, maintains complete service facilities at its headquarters at 3000 Sante Fe Ave., Los Angeles. A branch office is located in San Bernardino.

New Heil Distributors

Faulkner Machine Shop, Bourbon, Ind., is a new distributor appointed by The Heil Co., Milwaukee, Wis., to handle Heil truck bodies and hydraulic hoists. The dealer, located at S. Elm Road and Highway 30, will serve Marshall and Kosciusko counties on a nonexclusive basis for Heil.

A new Iowa dealer for Heil conversion hoists is the Sidles Co., 25 First St., Mason City. The company will serve a total of 15 counties.

The Thomas Elias Mfg. Co., Ltd., 1061 Notre Dame Ave., Winnipeg, Manitoba, will handle Heil's line of equipment in the entire province of Manitoba.

ESCO Names Distributor

The complete line of construction equipment specialties manufactured by the ESCO International Division of Electric Steel Foundry Co., Portland, Oreg., will be distributed by Frazar & Co., Inc., and its associated firms.

The Frazar organizations will distribute dragline buckets, shovel dippers, dozer and grader blades, end bits, the ESCO dozer rooter, and

GET 19" LIFT from 2½" CLEARANCE!

SIMPLEX
RATCHET LOWERING
JACKS

Lift or Lower the Load Notch by Notch—cannot be Tripped.

With Simplex Ratchet Lowering Jacks minimum toe clearance is necessary. Loads are usually lifted from the ground to the toe of the jack by pinch bars or wedges. Only Simplex Jacks provide equal lift capacity on toe or cap. No other jacks offer such a combination of low cost and all-purpose utility. In fast jacking action—extra-safety features—and rugged strength for longer life, Simplex Ratchet Lowering Jacks give you more for your money! Available in capacities of 1½ to 35 tons. Write today for Bulletin: Industrial 49.

SAFETY SUGGESTION—Use thin wood block—Don't lift or lower steel against steel.

Simplex
LEVER • SCREW • HYDRAULIC
Jacks

TEMPLETON, KENLY & CO.
2511 Gardner Road, Broadview, Ill.

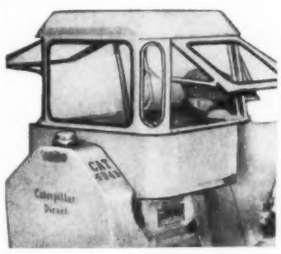
THE GOLDAK Featherweight MODEL 87
PIPE LOCATOR

FINDS THOSE PIPES!

- Gives EXACT location of buried pipes, mains, services, gates, tees, ells, stubs, etc.
- Easy, reliable one-man operation
- Compact, ruggedly built
- Featherweight — only 11 lbs. complete
- Guaranteed superior performance

WRITE FOR COMPLETE DETAILS

THE GOLDAK CO. 1500 W. GLENOAKS, GLENDALE 1, CALIFORNIA



COULD YOU SMILE ABOUT A "BAD-WEATHER" JOB?

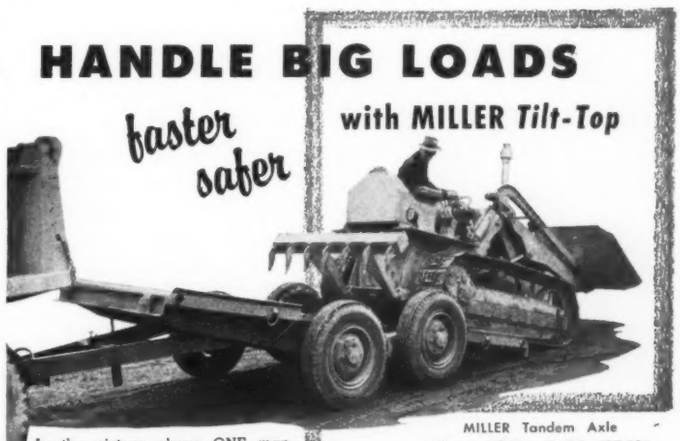
You Can If Your Tractor Is Equipped With a CAMPBELL "ALL-WEATHER" CAB

CAMPBELL CABS Provide
- Complete Protection from the elements
- Complete Visibility for the operator
- Opportunity to work — REGARDLESS of weather

ALL models have safety glass and aluminum tops
CAMPBELL CABS are available for most tractor models. For complete information, write to:

CAMPBELL DETACHABLE CAB CO.
WAUCONDA ILLINOIS

HANDLE BIG LOADS faster safer with MILLER Tilt-Top



MILLER Tandem Axle 10 ton Tilt-Top Model "BT-10"

In the picture above ONE man is loading a big, heavily equipped D-4 by simply driving it onto the tilted platform of the tandem axle Model "BT-10" MILLER Tilt-Top. The entire loading operation takes less than TWO minutes. Big and broad, the oak decked platform provides plenty of room and an extra low climb angle for maximum operator and equipment safety. For faster, safer between-job hauling of dozers, rollers, and other heavy equipment, get a MILLER Tilt-Top . . . you'll find it pays for itself!

✓ built best
✓ priced best

See your MILLER distributor or write for FREE literature to:

MILLER research engineers
Tilt-Top TRAILERS
456 S. 92nd Street, Milwaukee 14, Wis.

other ESCO equipment through Frazar offices in Tokyo, Japan; Seoul, Korea; and Taiwan, Formosa.

LeTourneau-Westinghouse Has New Texas Dealer

The South Texas Equipment Co., Inc., 5500 Navigation Blvd., Houston, Texas, has been appointed by LeTourneau-Westinghouse Co. to handle its line of high-speed rubber-tire construction equipment in the lower Texas territory.

The company, with a staff of eight salesmen, a seven-man parts department, and a service department, operates a branch at 3406 Roosevelt Ave., San Antonio. R. P. Doherty is president of the firm.

A-C Names Southern Dealer

The Wheeling, W. Va., firm of Wheeling Rubber Products, Inc., has been appointed by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., to handle its Texrope V-belt-drive equipment.

The dealer, located at 927 Market Street, will serve Ohio, Brooke, Marshall, Wetzel, Tyler, and Harrison counties in West Virginia; and Belmont, Harrison, and Monroe counties in Ohio. R. A. Charlton heads the firm.

Three Dealers Named For Detroit Engines

Three new representatives have been named by the Detroit Diesel Engine Division of General Motors Corp., Detroit, Mich. All three companies will offer sales and service in their respective areas.

In Indiana, Reid-Holcomb Co., Inc., 1815 Kentucky Ave., Indianapolis, will represent the company. Factory-approved sales and service are available in Arizona through the newly organized firm, Min-A-Con Equipment Co., Phoenix. The service & supply division of Lake Shore Engineering Co., Iron Mountain, Mich., will handle sales in the state's upper peninsula.

I-H Names Distributor

The Howell Tractor & Equipment Co., Chicago, Ill., has been appointed by International Harvester Co. as distributor for International Industrial Power products in northern Illinois and northwestern Indiana.

From its headquarters at 7443 S. Racine Ave., the company will sell and service a complete line of earthmoving equipment, engines, and power units.

Tom LaVorene is president and general manager of the firm, and Dave Howell is vice president.

Dealer Opens Branch

The George M. Philpott Equipment Co., San Francisco, Calif., dealer for Euclid and other construction-equipment manufacturers, has opened a new branch office at 2376 S. Railroad Ave., Fresno.

The new branch will be managed by James Meehan, the former service manager of the San Francisco office. Philpott also operates a branch in Monrovia, Calif.

Euclid Names Dealer

The James W. Bell Co., Inc., 1720 I Ave. N. E., Cedar Rapids, Iowa, has been appointed by the Euclid Division of General Motors Corp, as distributor for Euclid earthmoving equipment in the state of Iowa.

Bell, Inc., representing Euclid in all but Woodbury, Monona, Crawford, Harrison, Shelby, Pottawattamie, Mills, Montgomery, Fremont, and Page counties, operates a branch at 2745-51 Shenandoah Ave. N. W.,

Haiss Dealer in South

The George Haiss Mfg. Co., Inc., New York, N. Y., subsidiary of Pettibone Mulliken Corp., has appointed the Southern Machinery & Supply Co. exclusive distributor of the Haiss line of clamshell buckets in the state of Virginia.

Southern operates two offices, one at 2745-51 Shenandoah Ave. N. W., Roanoke, and the other at 3004 Kenwood Ave., Richmond.

President of Highway Machinery Co. Retires

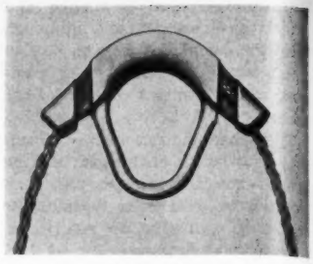
After 14 years as head of the company, Harry L. Teal is retiring from the presidency of the Highway Machinery & Supply Co., Inc., Richmond, Va. He will be succeeded by George Cole Scott.

A native of Ohio, Mr. Teal has been in the construction-machinery industry for many years, 15 of them with the Austin-Western Co. He is a member of the International Association of Equipment Distributors.

Iowa Appoints Welden State Bridge Engineer

The Iowa State Highway Commission, Ames, has promoted Neil Welden to the post of bridge engineer to succeed E. W. Blumenschein. A past president of the Iowa section of the American Society of Civil Engineers, Mr. Welden has been with the commission engineering staff since 1933.

The former bridge engineer, E. W. Blumenschein, has been named associate engineer. He has been with the commission since 1913.



The Newco bridle sling designed to avoid kinks and abrasion.

Two-Leg Bridle Sling Adjusts to Equalize Load

■ A new sling device on the market converts a conventional sling to a two-leg bridle sling. This eliminates the necessity of a pear link with two eye splices.

The Newco sling bridle has a tapered groove that grips the sling firmly to prevent load slippage even when the load is unbalanced. The legs of the sling are easily adjusted or equalized for different loads.

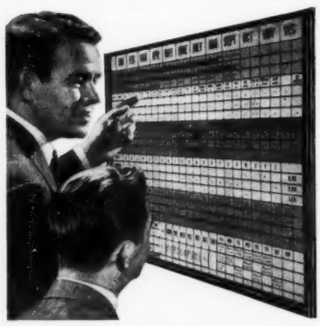
The bridle sling takes the wear from crane and hoist hooks and avoids sling kinks and severe abrasion.

For further information write to Newman Mfg. & Sales Co., P. O. Box 5939, Kansas City 11, Mo., or enter the manufacturer's name and address on the Request Card that is bound in at page 18.

O'HADI PATCHER for year 'round patching

The O'Hadi Patcher heats both hole and mix at the same time.
Heats the hole with contained radiant heat . . . NOT a direct flame.
An all weather Patcher.
FAST — ECONOMICAL — PERMANENT
Satisfaction guaranteed. Sold on 30 days' trial.
Write for full information.
BUHL MACHINE WKS., Buhl, Idaho

USE SWENSON SPREADERS FOR ICE CONTROL
SPREADS SALT 200 LBS. PER MILE!
Spreads Narrow Strip or Full Traffic Lane
Spreads all materials. Salt, cinders, sand, calcium chloride, rock chips, etc. Adjustable to spread any desired quantity in any width from a narrow strip to a full traffic lane.
Write for Complete Information
SWENSON SPREADER & MFG. CO.
LINDENWOOD, ILLINOIS



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★ BOARDMASTER Visual Control Saves You Time, Money.
★ Gives Graphic Picture of Your Operations at a Glance.
★ Simple to Operate, Type or Write on Cards, Snap in Grooves.
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★ Made of Metal. Compact and Attractive. Over 50,000 in Use.
Full price **$49.50** with cards
FREE 24-page illustrated BOOKLET No. C-100 Without Obligation
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PREFERRED by CONTRACTORS
Less initial cost — Lower upkeep
1½ HP to 5 HP
MARVEL CONCRETE VIBRATORS
GV-1, GV-2 & GV-3 MODELS NOW EQUIPPED WITH AUTOMATIC CENTRIFUGAL CLUTCH AS STANDARD EQUIPMENT. INTERCHANGEABLE FLEXIBLE SHAFTS.
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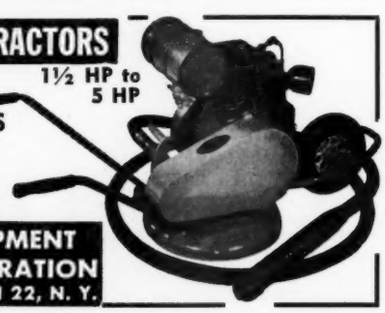

. . . our business is removing stumps without costly damage to sidewalks, cables and curbs. An inexpensive, practical method that will remove up to 8 stumps per day with the revolutionary

O'BRIEN STUMP CUTTER
tested and proven for performance AND ECONOMY!
NO MORE BLASTING, BURNING, DIGGING . . . AND CUTS COSTS!
Developed after years of research and experimentation, the O'Brien Stump Cutter will cut out *any* size stump below the level of sidewalk or lawn area and reduce it to shavings.
Write for Complete Details
Distributor Inquiries Invited
Metal Parts Machining Corp.
WATERVLIET NEW YORK

Reo Motor's new short-dimension Series A trucks are only 96 inches from bumper to the back of the cab. They can haul, under legal limits, round or square-nose trailers up to 35 feet in length.

Short-Dimension Trucks and Compact V-8 Engines

■ Two new V-8 power plants and a new series of short-dimension trucks extend the Reo heavy-duty truck line into the 60,000 to 78,000-pound gross-combination-weight class. Like the in-line six-cylinder engine in the Gold Comet series, first introduced by Reo in 1949, the new V-8's feature a short stroke, removable "wet" cylinder sleeves, and a high percentage of interchangeable parts.

The larger of the two new Gold Comet engines has a 441-cubic-inch displacement and develops 220 maximum gross brake horsepower at a governed speed of 3,200 rpm. The second unit has a 390-cubic-inch displacement and produces 195 gross horsepower at the same governed speed. The engines weigh only 1,211 pounds each with accessories and flywheel housing, and 1,739 pounds each with clutch and transmission.

Only 39½ inches long from the front of the fan to the rear of the flywheel housing, the new V-8's can be installed in conventional truck-tractors that are only 96 inches long from the front of the bumper to the back of the cab and which weigh less than 10,500 pounds. In addition to powering a new line of Reo truck models, the V-8's will be available in complete kit form for installation as replacement engines in all makes of trucks.

The new Series A Reo trucks includes 12 models. These range from the A-600 truck, with a gross vehicle weight of 28,000 pounds, to the A-733, a 6×4 tractor with a gross combination weight of 78,000 pounds. The new line also includes 6×2 trucks and tractors with a trailer-type "dead" axle in the tandem assembly.

The Series A units have a blunted front end to keep the length down to 96 inches without reducing interior cab space. Other features include step-type fuel tanks as standard equipment, a hood that swings down and forward for routine maintenance, and a fender assembly that can be entirely removed by taking out four bolts. A five-speed Synchromesh (Spicer) transmission is standard on all models.

For further information write to Reo Motors, Inc., Lansing 20, Mich., or enter the manufacturer's name and address on the Request Card at page 18.

Precision Survey Transit

■ A newly imported 5½-inch precision survey transit has been announced by Umeco Optical Division, 465 California St., San Francisco 4, Calif.

The instrument weighs only 13½ pounds, but has a high-powered 9½-inch-long telescope with coated lenses. The horizontal circle is 5½ inches in diameter with graduations reading direct to 20 minutes and verniers reading to 20 seconds. The vertical circle is 4½ inches in diameter and graduated to 30 minutes with verniers reading to 1 minute.

The survey transit is made in Japan to American specifications and under American supervision. It is tested before overseas shipment and upon receipt in the U. S. Accessories and parts are readily available and interchangeable with those made in America.

For further information write to the company or enter the manufacturer's name and address on the Request Card at page 18.

CUTS COST IN DRILLING ANY MASONRY MATERIAL

Choose from the only COMPLETE LINE. Cyclo-twist and Cyclo-Core for Rotary Drilling — Thunder-twist and Thunder-Core for Hammer Drilling. Drill ANY KIND OF MASONRY, soft, medium, hard or abrasive; ANY SIZE OF HOLE from ⅛" to 6"; ANY DEPTH OF HOLE UP TO 36"; for ANY TYPE OF DRILL, Electric Rotary Drill or Power Hammer. DO THE JOB QUICKER, EASIER AND MORE ECONOMICALLY.

SEND TODAY FOR YOUR *FREE* "What and How" Manual of Masonry Drilling. Helps you to choose the right bit for every job.

New England
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60 Brookline Street, Cambridge 39, Mass.
Please send me my *FREE* "What and How" Manual.
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STREET _____
CITY _____ STATE _____
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WIRE ROPE CUTTERS
Portable • Rugged • Safe • Fast
Made to J.A.N. Specs.
Priced from $12.00
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INDEX TO ADVERTISERS

(Names in italics are advertising agencies)

Acker Drill Co., Inc. 92
Bauer Advertising, Inc.

Adams Mfg. Co., J. D. 121
Caldwell, Larkin & Co., Inc.

Allis-Chalmers Tractor Div. 106
Bert S. Gittins, Advertising

Allison Div. of GMC 64
Kudner Agency, Inc.

Aluminum Industries, Inc. . 61
Keelor & Stites Co.

American Air Filter Co., Inc., Herman Nelson Div. .. 93
Zimmer-McClaskey

American Cyanamid Co. .. 114
Hazard Advertising Co.

American Tire Machinery, Inc. 116
Bob Robinson, Inc.

Arps Corp. 128
Ervin R. Abramson, Advertising

Audio Equipment Co., Inc. 149
J. J. Coppo Company

Austin-Western Co. 72
Merrill, McEnroe & Assoc., Inc.

Avery Tractor Co. 152
Norman Simpson, Advertising

Badger Machine Co. 120
Graves & Associates

Baker-Roos, Inc. 34
George S. Diener Co.

Baldwin-Lima-Hamilton Corp. 59
Ketchum, MacLeod & Grove, Inc.

Barber-Greene Co. 44, 45
Buchen Co.

Barco Mfg. Co. 74
Armstrong Adv. Agency

Barnes Mfg. Co. 108
Odell & Associates

Bethlehem Steel Co. 158
Jones & Brakeley, Inc.

Birmingham Mfg. Co. 122
Silver & Douce Co., Inc.

Blaw-Knox Equip. Div., Blaw-Knox Co. 141
Russell T. Gray, Inc.

Braden Winch Co. 87
Watts, Payne—Adv., Inc.

Broadway Mfg. Co. 33

Browning Mfg. Co. 138

Bucyrus-Erie Co. 69
Bert S. Gittins, Advertising

Buffalo-Springfield Roller Co. 70
Spencer Curtiss, Inc.

Buhl Machine Works 154
Crescent Adv. Service

California Welding & Blacksmith Shop, Inc. 74
Dan Ebberts Adv. Service

Campbell Detachable Cab Co. 153

Carter Co., Ralph B. 16
Edward J. Cort Co.

Cartwright Industries, Inc. . 142
Silver & Douce Co., Inc.

Caterpillar Tractor Co. 7, 14, 21, 137, 159
N. W. Ayer & Son, Inc.

Celotex Corp. 129
MacFarland, Aveyard & Co.

Chevrolet Div., GMC 102
Campbell-Ewald Co.

Chicago Pneumatic Tool Co. 24
G. M. Basford Co.

Childers Mfg. Co., W. L. .. 84

Chrysler Corp., Industrial Engine Div. 42
Zimmer, Keller & Calvert, Inc.

C.I.T. Corp. 118, 119
Fuller & Smith & Ross, Inc.

Clark Equip. Co., Constr. Machy. Div. 160
Marsteller, Gebhardt & Reed, Inc.

Clayton Mfg. Co. 117
Franklin Associates

Cleveland Trencher Co. ... 88
Meermans, Inc.

Clyde Co. 111

Clyde Iron Works, Inc. ... 51
Graves & Associates

Colorado Fuel & Iron Corp. 33
Doyle, Kitchen & McCormick, Inc.

Concrete Sawing Equip., Inc. 130
Frank Barrett Cole, Advertising

Concrete Surfacing Machinery Co. 128

Construction Machinery Co's. 94
Weston-Barnett, Inc.

Continental Motors Corp. .. 148
Hopkins Agency

Continental Rubber Works 98
Eugene C. Laird, Advertising

Conver Steel & Wire Co., Inc. 60
Friend, Krieger & Rader, Inc.

Cotta Transmission Co. ... 68
Howard H. Monk & Associates, Inc.

Dart Mfg. & Sales Co. 136
Wayne, Welch, Inc., Adv.

Dart Truck Co. 109
Carl Lawson Adv. Co.

Davenport Besler Corp. ... 79
Fred A. Hinrichsen Adv. Agency

Des Lauriers Column Mould Co. 132
Hanson & Hanson, Inc.

Detroit Diesel Engine Div., GMC 112, 113
Kudner Agency, Inc.

Dixie Tallyho, Inc. 67
Crawford & Porter, Inc.

Dixon Valve & Coupling Co. 152
George C. Taylor, Advertising

Dodge Div., Chrysler Corp. . 58
Ross Roy, Inc.

Dorsey Trailers 43
Morris Timbes, Inc.

Drake-Williams-Mount ... 98
Anderson & Roll

Drott Mfg. Co. 145
Leo Burnett Co., Inc.

Dudgeon, Inc., Richard 129
Richmond Adv. Service, Inc.

Duff-Norton Mfg. Co. 139
Bond & Starr, Inc.

Duplex Truck Co. 35
Jepson-Murray, Advertising

Eagle Crusher Co., Inc. ... 110
Coleman Todd & Associates

Eagle Iron Works 136
Tri-State Adv. Co.

Economy Forms Corp. 94
J. M. Hickerson, Inc.

Eimco Corp. 11
Matsie Co.

Etnyre & Co., E. D. 54
Howard H. Monk & Associates, Inc.

Euclid Div., GMC 48, 49
Richard T. Brandt, Inc.

Farnco Sales Co. 93

Felker Mfg. Co. 30
Clyde D. Graham, Advertising

Fennel Instrument Corp. of America 146
Posner-Zabin

Flaherty Mfg., Inc. 127
Don Watkins, Advertising

Franki Foundation Co. 117
Richard LaFond Adv., Inc.

Fuller Mfg. Co. 115
Spencer Curtiss, Inc.

Galion Iron Works & Mfg. Co. 41
Morgan Advertising Co.

Gar-Bro Mfg. Co. 76
Dan Ebberts Adv. Service

Garrett Distributors 66
Gail Advertising Co.

Garrison Mfg. Co. 22
Clyde D. Graham, Advertising

Gar Wood Industries, Inc. .. 57
Dobbins, Woodward & Co.

Gledhill Road Machinery Co. 103
Coleman Todd & Associates

Goldak Co. 153
Simons Adv. Agency

Goodall Rubber Co. 150
George C. Taylor, Advertising

Goodyear Tire & Rubber Co. 5
Kudner Agency, Inc.

Graphic Systems 154
Diener & Dorskind, Inc.

Greenlee Tool Co. 22
Howard H. Monk & Associates, Inc.

Gulf Oil Corp. 40
Young & Rubicam, Inc.

Gunderson-Taylor Machinery Co. 30
Ball & Jenkins, Inc.

Gurley, W. & L. E. 92
Fred Wittner, Advertising

Hardie Mfg. Co. 99
Beeson-Reichert Inc.

Harnischfeger Corp. 73
Buchen Co.

Hauck Mfg. Co. 78
Spooner & Kriegel

Haynes Stellite Co. 104
J. M. Mathes, Inc.

Hayward Co. 55
Rickard & Co., Inc.

Heller Engineering & Mfg. Co. 78
Danken Associates

Hendrix Mfg. Co., Inc. ... 90
Svolos Adv. Service

H & L Tooth Co. 17
Orange County Printing Co.

Hobart Brothers Co. 116
Ralph Dalton & Associates

Hobbs Corp., J. W. 149
Mace Adv. Agency, Inc.

Hough Co., Frank G. 39
Ervin R. Abramson, Advertising

Hunt Process Co., Inc. 114
Degner & Associates

Hyster Co. 18
Cole & Weber

Hy-Way Machinery, Inc. .. 46
Flad-Erwin, Advertising

Ideal Reel Co. 62

Insley Mfg. Corp. 138
Bozell & Jacobs, Inc.

Insto-Gas Corp. 95
Miller Adv. Agency

International Harvester Co. 80, 81, 122, 145
Leo Burnett Co., Inc.

Iowa Mfg. Co. 132
Russell T. Gray, Inc.

Jackson Mfg. Co. 149
Michener & O'Connor, Inc.

Jackson Vibrators, Inc. 134
Stevens, Inc.

Jaeger Machine Co. 79
Mumm, Mullay & Nichols, Inc.

Johnson Co., C. S. 37
Andrews Agency, Inc.

Contractors and Engineers

marketplace of modern construction

Kasson Die & Motor Corp. . 139
Lawrence Peskin, Inc.

Kern Instruments Inc. 135
Richmond Adv. Service, Inc.

Keystone Asphalt Prod. Co. 99
Turner Adv. Agency

Kiesler Co., Joseph F. 106

K & N Machine Works, Inc. 124
Harper Co.

Koehring Co. 36
Andrews Agency, Inc.

Koffler Sales Corp. 141

Kwik-Mix Co. 37
Andrews Agency, Inc.

LeBus Rotary Tool Works, Inc. 67
Ted Workman, Advertising

Leschen Wire Rope Div. .. 143
Arthur R. MacDonald, Inc.

LeTourneau-Westinghouse Co. 71, 147
Andrews Agency, Inc.

Lippmann Engineering Works 25
Ervin R. Abramson, Advertising

Littleford Brothers, Inc. .. 68
Jaap-Orr Co.

Lombard 85
Berg-Marshall, Inc.

Madsen Iron Works, Inc. .. 10
Frank Barrett Cole, Advertising

Maginniss Power Tool Co. . 142
Cye Landy Adv. Agency, Inc.

Maintenance Co., Inc. 145

Manitowoc Engineering Corp. 15
Ervin R. Abramson, Advertising

Marion Metal Products Co. 61
Jay H. Maish Co.

Marion-Osgood-General, Div. of Marion Power Shovel Co. 38
Jay H. Maish Co.

Marlow Pumps 65
Richard LaFond Adv., Inc.

Martin-Decker Corp. 75
Dozier Eastman & Co.

Marvel Engineering Co. ... 86
Guenther-Bradford & Co.

Marvel Equipment Corp. .. 154
Richmond Adv. Service, Inc.

Material Handling, Inc. ... 35
Christy Humburg Adv. Agency

McCaffrey-Ruddock Tagline Corp. 135
Martin R. Klitten Co., Inc.

McConnaughay, K. E. 131
Grubb & Petersen

McGee Mfg. Co., Leland T. 124
Clark Collard Adv. Agency

McKiernan-Terry Corp. ... 100
Michel-Cather, Inc.

McKinney Drilling Co. 31

McKissick Products Corp. . 12
Martha Stone & Associates

Messenger Vibrators 136

Metal Parts Machining Corp. 154

Mid-Western Industries, Inc. 28
Associated Adv. Agency, Inc.

Miller Research Engineers . 153
Franklin Fisher Adv. Agency

Miller Spreader Corp. 67
Flad-Erwin, Advertising

Minneapolis-Moline 62
Graves & Associates

Miracle Decal Co. 155
Lago & Whitehead Co.

Mixermobile Distributors, Inc. 127
McMurphey & Webber, Inc.

Monarch Road Machinery Co. 69
Etheridge Co.

Morgen Mfg. Co. 137

Muller Machinery Co., Inc. 131
Thoma & Gill

New England Carbide Tool Co., Inc. 155
Callaway Associates

Onan & Sons, Inc., D. W. .. 135
Graves & Associates

Parsons Co. 37
Andrews Agency, Inc.

Pence Co., Inc., Earl H. 38
Small & Gautreaux

P & G Supply Co. 123
Hargreaves Advertising

Pioneer Engineering Works 77
Alfred Colle Co.

Power-Pack Conveyor Co. . 140
Richard T. Brandt, Inc.

Power Products Corp. 111
Ken Seitz & Associates

Prehy Co. 148

Quick-On Co. 150

Quinn Wire & Iron Works 120
Lessing Adv. Co., Inc.

Rockford Clutch Div. 128
Midwest Adv. Agency

Rodgers Hydraulic Inc. 55
Foulke Agency, Inc.

Roebling's Sons Corp., John A. 91
Beatty & Oliver, Inc.

Roeth Vibrator, Inc. 152
C. W. Munger, Advertising

Rome Plow Co. 31
Crawford & Porter, Inc.

Rosco Mfg. Co. 89
Foulke Agency, Inc.

R.P.B. Corp. 84
John C. Fellows Co.

Sasgen Derrick Co. 72
Symonds, MacKenzie & Co., Inc.

Sauerman Brothers, Inc. ... 87
Symonds, MacKenzie & Co., Inc.

Seaman Motors, Inc. 52, 53
Morrison-Greene-Seymour, Inc.

Service Supply Corp. 148
Roland G. E. Ullman Organization

Shaw Sales & Service Co. .. 146

Shepherd Tractor & Equipment Co. 140

Siebring Mfg. Co. 123
Amundson-Bolstein, Inc.

Silent Hoist & Crane Co. .. 66
Harry Hurst, Advertising

Slope-Meter Co. 115

Smith & Co., Inc., Gordon . 39
Zimmer-McClaskey

Sonoco Products Co. 56
Bennett-Advertising, Inc.

Southwest Welding & Mfg. Co. 82
Dan Ebberts Adv. Service

Sprague & Henwood, Inc. . 43
Frederick B. Garrahan, Ind. Adv.

Spray Starting Fluid Co. ... 46
Ecoff & James, Inc.

Standard Oil Co. (Indiana) 63
D'Arcy Adv. Co.

Standard Steel Corp. 23
McCarty Co.

Stang Corp., John W. 30
McCarty Co., Adv., Inc.

Sta-Vis Oil Co. 142
Matson, Marquette & Soash, Inc.

Stoody Co. 144
Clyde D. Graham, Advertising

Storer Decal Co. 57

Stow Mfg. Co. 95
Riger & Sheehy

Superior Equipment Co. ... 146
Coleman Todd & Associates

Superior Lidgerwood Mundy Corp. 58
Albert Frank-Guenther Law, Inc.

Swenson Spreader & Mfg. Co. 154
E. R. Hollingsworth & Associates

Symons Clamp & Mfg. Co. 32
Marsteller, Gebhardt & Reed, Inc.

Syntron Co. 124
Servad, Inc.

Teale & Co. 126
Zimmerman Adv. Agency

Templeton, Kenly & Co. ... 153
Glenn-Jordan-Stoetzel, Inc.

Termite Drills, Inc. 41
Frank Barrett Cole, Advertising

Testing Service Corp. 125

Texas Co., Asphalt 2

Texas Co., Lubricants 8, 9
Erwin, Wasey & Co., Inc.

Thew Shovel Co. 133
Thomson Adv., Inc.

Timken Roller Bearing Co. . 96
Batten, Barton, Durstine & Osborn, Inc.

Transport Trailers, Inc. 75
Ettinger Adv. Agency

Twin Disc Clutch Co. 101
Spencer Curtiss, Inc.

Union Metal Mfg. Co. 97
Griswold-Eshleman Co.

United States Motors Corp. 150
Geer-Murray Co.

United States Rubber Co. . 105
Fletcher D. Richards, Inc.

United Steel Fabricators, Inc. 151
Walker & Downing, Ind. Adv.

Universal Atlas Cement Co. 107
Batten, Barton, Durstine & Osborn, Inc.

Universal Engineering Corp. 125
W. D. Lyon Co.

Universal Form Clamp Co. . 47
Ross Llewellyn, Inc.

Vacuum Concrete, Inc. 56
Loog, Katz & Barrington

Van Brush Mfg. Co. 105

Vibro-Plus Products, Inc. .. 126
Woodward & Byron, Inc.

Victor Equipment Co. 29
George C. McNutt, Advertising

Vulcan Tool Mfg. Co. 107

Warren-Knight 77
Walter S. Chittick Co.

Water Seals, Inc. 140
Lester L. Jacobs, Inc.

Watts & Co., Charles R. ... 109
Burke Co.

Welded Products Co. 85

White Co., David 130
Calkins & Holden, Inc.

Whiteman Mfg. Co. 50
Taggart & Young

Wilkinson Products Co. ... 152

Willard Concrete Machinery Sales Co. 110
Dan Ebberts Adv. Service

Williams Form Engineering Corp. 66
Contemporary Adv. Co.

Williams Mfg. Co., Hugh B. 19

Windsor Machinery Corp. . 13
Taylor & Greenough Co.

Winslow Scale Co. 151

Wisconsin Motor Corp. ... 86
Paulson-Gerlach & Assoc., Inc.

Wrought Washer Mfg. Co. 34
Paulson-Gerlach & Assoc., Inc.

Wylie Mfg. Co., Inc. 23
Galloway-Wallace Adv. Agency

Wyzenbeek & Staff, Inc. .. 32

Young & Greenawalt Co. .. 129
Ross Llewellyn, Inc.

MANUFACTURER MEMOS

Development Engineers Appointed by Clark

New additions to the engineering staff of the construction machinery division of Clark Equipment Co., Buchanan, Mich., are Paul McAdams and Walter Ross, Jr. Both men are development engineers.

Mr. McAdams formerly was associated with R. G. LeTourneau, Inc., Longview, Texas, in such capacities as research and development superintendent, manufacturing superintendent, and special project engineer. Before joining Clark, manufacturer of material-handling equipment and the Michigan line of construction equipment, Mr. Ross was with the Dart Truck Co., Kansas City, Mo., as development and design engineer and sales engineer.

Adams Names Executive

Buel Wallis has been appointed by the J. D. Adams Mfg. Co., Indianapolis, Ind., as general sales manager. During his 25 years with the company, Mr. Wallis has served in Adams' branch offices in Dallas, St. Louis, Memphis, Atlanta, and Des Moines. Since 1946, he has held various posts at the Indianapolis office.

Le Roi Names Executive

Paul I. Birchard has been appointed vice president and general manager of the Le Roi Division of Westinghouse Air Brake Co., Milwaukee, Wis., manufacturer of air compressors, internal-combustion engines, and construction tools. He replaces Edward J. Green, who has returned to the Pittsburgh, Pa., office.

In the diesel-engine industry for 26 years, Mr. Birchard has been associated with General Motors, Fairbanks-Morse, and Winton.

E. C. Brekelbaum, new assistant to the general manager of the Thew Shovel Co.

Brekelbaum Will Assist Manager of Thew Shovel

Matters pertaining to methods, engineering, and quality control have been placed under the jurisdiction of E. C. Brekelbaum, recently appointed assistant to the general manager of The Thew Shovel Co., Lorain, Ohio, manufacturer of Lorain power shovels and cranes.

Mr. Brekelbaum joined Thew in 1952 as director of methods. A professional engineer, he is a member of the American Welding Society, Iron and Steel Engineers' Society, and Society of Automotive Engineers.

Armco Elects R. L. Gray Executive Vice President

R. L. Gray has been elected executive vice president of Armco Steel Corp., Middletown, Ohio. A member of the board of directors since 1940, he was formerly president of the Sheffield Steel Corp., an Armco subsidiary which recently became the Sheffield Steel Division. John W. Anderson succeeds Mr. Gray as president of the division. In other promotions, H. H. Tullis and R. S. Gruver, vice presidents of the corporation, were elected administrative vice presidents.

Mr. Gray was associated with Valley Steel Co. and the Laclede Steel Co. in St. Louis before becoming chief engineer of the Kansas City Bolt & Nut Co., the firm later incorporated as Sheffield Steel. He became president of the corporation in 1925, and remained in that position when the organization was acquired by Armco.

Barrett Division Names Stupp Vice President

C. G. Stupp, technical director of Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., has been made vice president of the division. He will continue in charge of technical activities of the division.

Mr. Stupp has been technical director of the organization since 1951. In his 38 years with Barrett, he has been connected with the manufacturing and research departments.

Carlisle Appoints Two

Wayne E. Bessette has been appointed sales representative for the Carlisle Chemical Works, Inc., Reading, Ohio. His territory includes the entire state of New Jersey and parts of New York and Pennsylvania.

The former New Jersey representa-

Beth-Cu-Loy galvanized pipe carries Delaware-Raritan Canal for 800 ft while retaining wall is built in the bed. *General Contractor:* F. A. Canuso & Sons, Philadelphia. Pipe was fabricated by Penn Metal Corporation of Pennsylvania, Philadelphia.

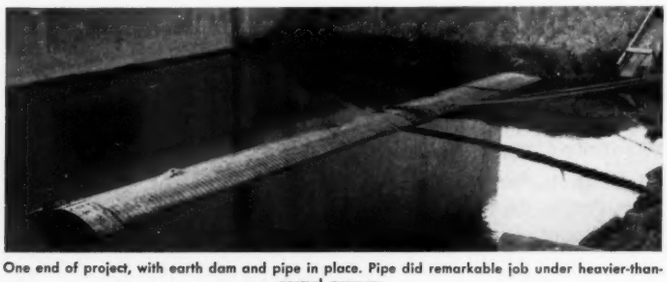
They had to "can" the canal without stopping its flow

Rolling leisurely through that corrugated steel pipe is the Delaware-Raritan Canal, near Trenton, N. J. It's in there because the contractor had to build an 800-ft highway retaining wall in the canal bed, and his contract stipulated that the flow of water remain uninterrupted.

They accomplished this in a rather ingenious way. First, they fabricated a 78-inch pipe of Beth-Cu-Loy galvanized steel culvert sheets, in sections 20 ft long. They submerged these sections and divers coupled them under water. Earth dams were then thrown across each end of the 800-ft stretch, and the water was pumped out between the dams. With the canal thus "canned," construction crews had a dry bed to work on. Once the wall was completed, the dams were removed, the pipe recovered, and the canal reverted to normal.

This unusual application proved a natural for Beth-Cu-Loy culvert sheets. The Beth-Cu-Loy pipe was easy to couple, even underwater. Its light weight made installation easier and faster. And its rugged strength was a lifesaver on this job where, for economy reasons, Beth-Cu-Loy had to be used in 12-gage under conditions normally calling for a heavier gage.

While Bethlehem does not fabricate Beth-Cu-Loy culvert or drainage *pipe*, we do manufacture the Beth-Cu-Loy galvanized corrugated or flat steel stock used by fabricators. Any Bethlehem sales office will furnish detailed information on Beth-Cu-Loy, including the names of fabricators who use it.



One end of project, with earth dam and pipe in place. Pipe did remarkable job under heavier-than-normal pressure.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETH-CU-LOY *GALVANIZED* CULVERT SHEETS

tive, Don H Hattersley, has been assigned to cover the midwestern territory and will work out of the home office.

Lawrence E. MacDonald, new B-E general sales manager.

Bucyrus-Erie Appoints

Lawrence E. MacDonald has been promoted to general sales manager of Bucyrus-Erie Co., South Milwaukee, Wis., manufacturer of heavy-construction equipment. Formerly sales manager for excavator distributors, he has been with the company for over 28 years. In his new post, Mr. MacDonald will be responsible for all domestic sales.

The new sales manager of the northwest district sales region is Robert P. Brooks. He will be responsible for sales of all B-E products in the states of Washington, Oregon, Idaho, and Montana, the territory of Alaska, the provinces of British Columbia and Alberta, and the Yukon territory.

Mr. Brooks will make his headquarters in the Seattle district sales office.

American Chain & Cable Makes Two Promotions

Warren W. Runkle has been appointed New York-New England district sales manager for the wire rope divisions of American Chain & Cable Co., Inc., Bridgeport, Conn. Mr. Runkle, with the company's sales organization for the past 26 years, will make his headquarters in New York City.

Taking Mr. Runkle's place as the Pittsburgh district sales manager for the divisions is W. T. Kyle. From his headquarters in Pittsburgh, Mr. Kyle will supervise sales in West Virginia, Ohio, western Pennsylvania, and Kentucky. Mr. Kyle joined the company in 1939, and has been the Ohio representative since 1947.

Hewitt-Robins Names Two

Two new appointments have been made by Hewitt-Robins, Inc., Stamford, Conn. Hamilton M. Ross has been named to the post of manager of operations of the conveyors division, and Harold E. Murken has been appointed manager of conveyor system sales.

Mr. Ross had been manager of Hewitt-Robins' plants in Passaic, N. J., and Philadephia, Pa. In addition to his duties in this post, he will now be responsible for the Passaic sales staff.

Formerly product sales manager in Passaic, Mr. Murken was instrumental in the recent consolidation of the conveyor engineering departments in Passaic and New York into a single office. From his headquarters in New York, he will coordinate the activities of the general sales organization and the engineering department.

Westinghouse Air Brake Names Sales Executive

Charles J. Haring has been appointed director of equipment sales by the Westinghouse Air Brake Co. He will join the company's executive staff at Gateway Center, Pittsburgh, Pa.

In his new position, Mr. Haring will assist in coordinating the sales efforts of all the Westinghouse divisions and subsidiary companies by integrating their merchandising activities. His appointment to the newly created sales post is part of the company's diversification program begun in 1951.

Atlas Powder Elects

Edward J. Goett, formerly director of the commercial development department of Atlas Powder Co., Wilmington, Del., has been elected a vice president and director of the company by the board of directors. He will be in charge of the company's chemicals, Darco, and commercial development departments.

A chemical engineer, Mr. Goett joined Atlas last July. He is a member of the American Institute of Chemical Engineers, American Chemical Society, and American Institute of Chemists.

Assisting Mr. Goett will be Kenneth E. Mulford, former general manager of the chemicals department.

Barnes Appoints Webster

The new district manager in the south central district for Barnes Mfg. Co., Mansfield, Ohio, is Charles D. Webster. As the representative for the manufacturer of pumps and water systems, Mr. Webster will have headquarters in Memphis, Tenn.

He will manage sales and service facilities for the entire line of Barnes equipment in Alabama, Mississippi, eastern Arkansas, western Tennessee, and southern Kentucky.

When Operator becomes Owner...

what kind of equipment does he buy?

Listen to J. R. Norman of the brand-new firm of Gibson & Norman, Indianapolis, Indiana.

"I've been an operator since 1949. In that time I've handled all types and makes of crawler equipment. And you know, when you're starting out in business for yourself, you have to have equipment that'll last for a long time. I know Caterpillar machines are the best made. With them you get more work, and less breakdown."

Here's the CAT* No. 40 Scraper Joe Norman bought last year. He works it with a D4 Tractor building gravel road for a housing development in Indianapolis.

He can heap 4½ cubic yards in that bowl, and the No. 40's hydraulic system gives him controlled dumping at all times. The no-overhead design of the open bowl lets him take advantage of top loading and gives him good visibility on any kind of turn. And by the way, he can turn this trim rig in just 19 feet!

Whether you're starting in business like Joe Norman, or are an old hand, it'll pay you to give your own Caterpillar Dealer a call. He'll be glad to demonstrate the No. 40 Scraper, or any machine in the big yellow line. And remember, he's always ready with prompt, genuine parts service, too.

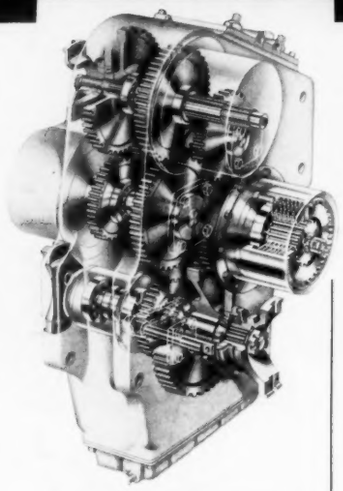
Caterpillar Tractor Co., Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks —®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Driver's left hand rests on power-shift levers—there's no clutch pedal



Here's the secret of
BIG TIME-SAVINGS:

the MICHIGAN Power-Shift Transmission! Forward-Reverse and High-Low gears are in constant mesh. Shifting is accomplished by hydraulic pressure. The power-shift levers on the steering column actuate control valves in the transmission. These valves direct oil pressure to the multiple disc-clutches, transmit engine power from the selected drive gears to the output shaft. Hydraulic oil completely lubricates oil drive gears and bearings as it flows from top to bottom and returns to the sump through a fine-mesh screen.

You'll cut your loading time!

with the MICHIGAN Power-Shift Transmission

Operating a MICHIGAN Tractor Shovel is both fast and easy. Gone is the old-fashioned heavy duty foot clutch; gone is the tiresome work of clutching every time you shift gears.

The MICHIGAN Power-Shift Transmission does all the work for you. All you do is operate the finger-tip hand levers on the steering column . . . one for Forward-Reverse, the other for High-Low speed. Make either shift *while moving in either direction without coming to a stop.*

The MICHIGAN'S power-shift transmission speeds up operation, cuts loading time, gets you TOP YARDAGE per day.

Get a demonstration right on your own job. It is easily arranged: just phone your MICHIGAN distributor. Did you know MICHIGAN Tractor Shovels are available under the Clark Leasing Plan? We would be glad to send you full details.

CLARK EQUIPMENT

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